Smithsonian

July 1983

An endangered tree frog hangs on in New Jersey's unique Pine Barrens (p. 78)

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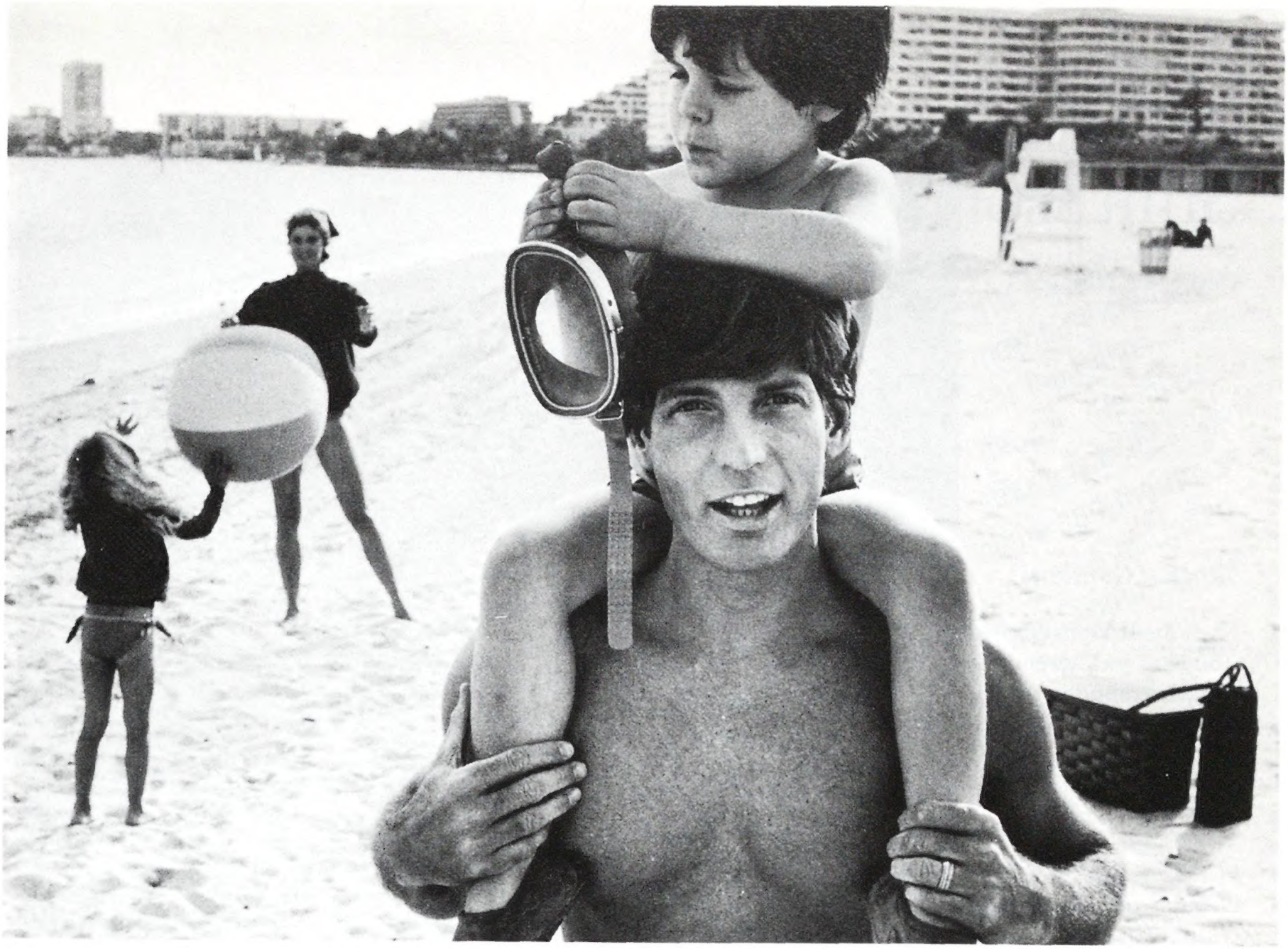

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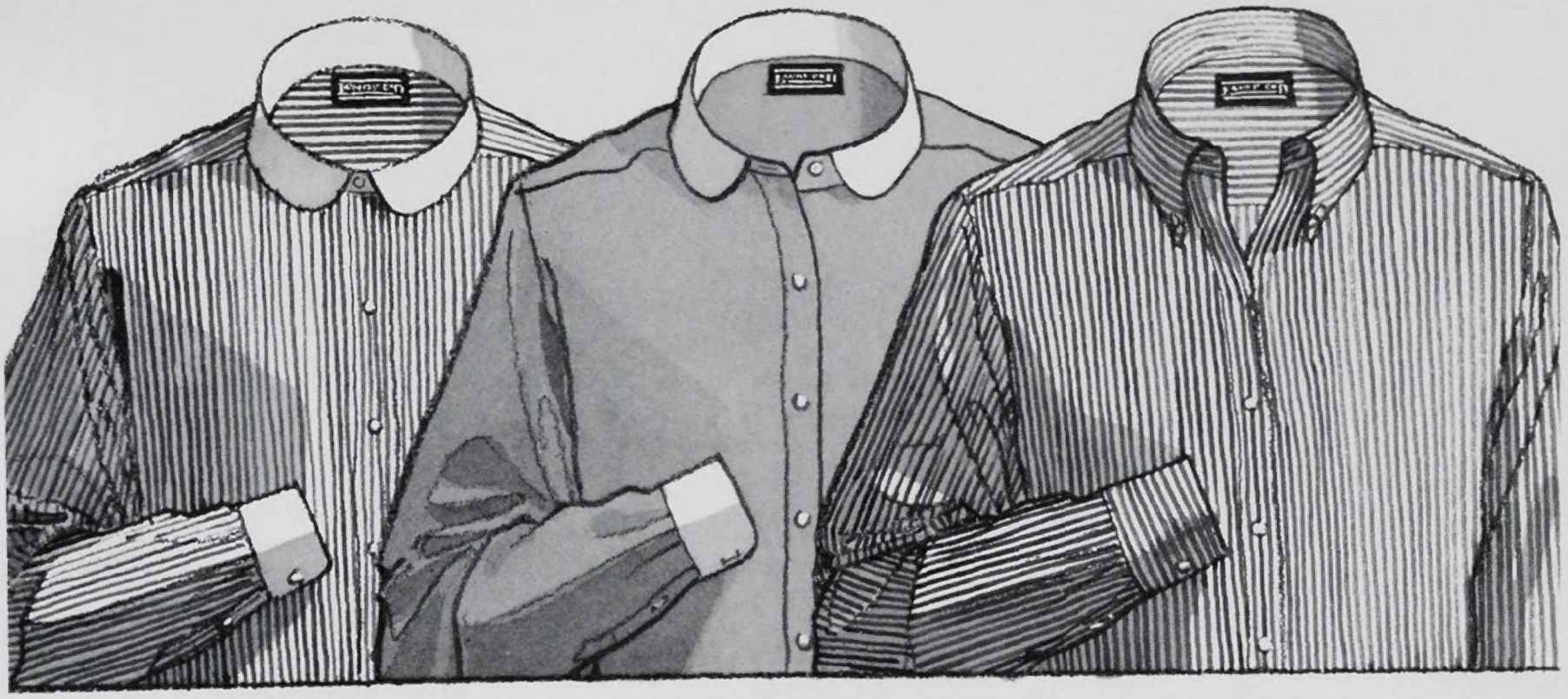

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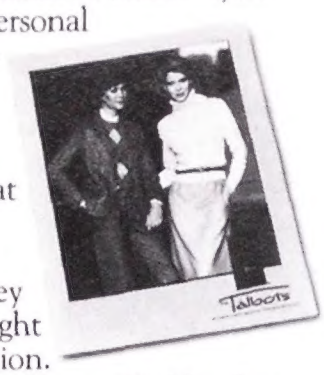

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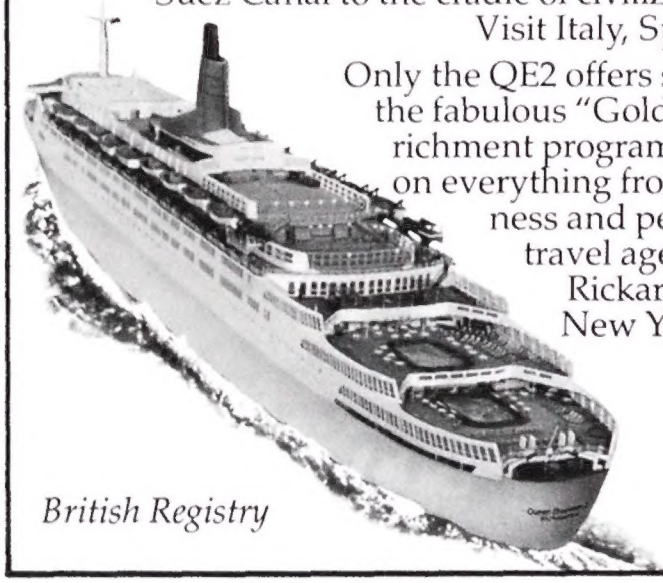

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The Acoustic Detection

The Acoustic Detection

Scientists have studied microstructural discontinuities in high-carbon steel since the early 1920s. By monitoring acoustic emissions, a materials research engineer at the General Motors Research Laboratories has arrived at a more detailed understanding of how one type of discontinuity occurs.

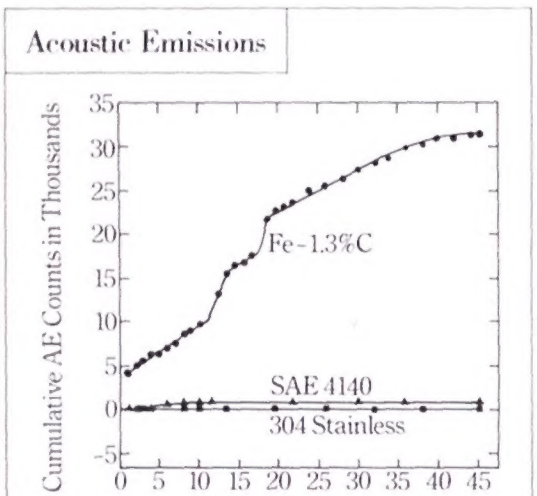
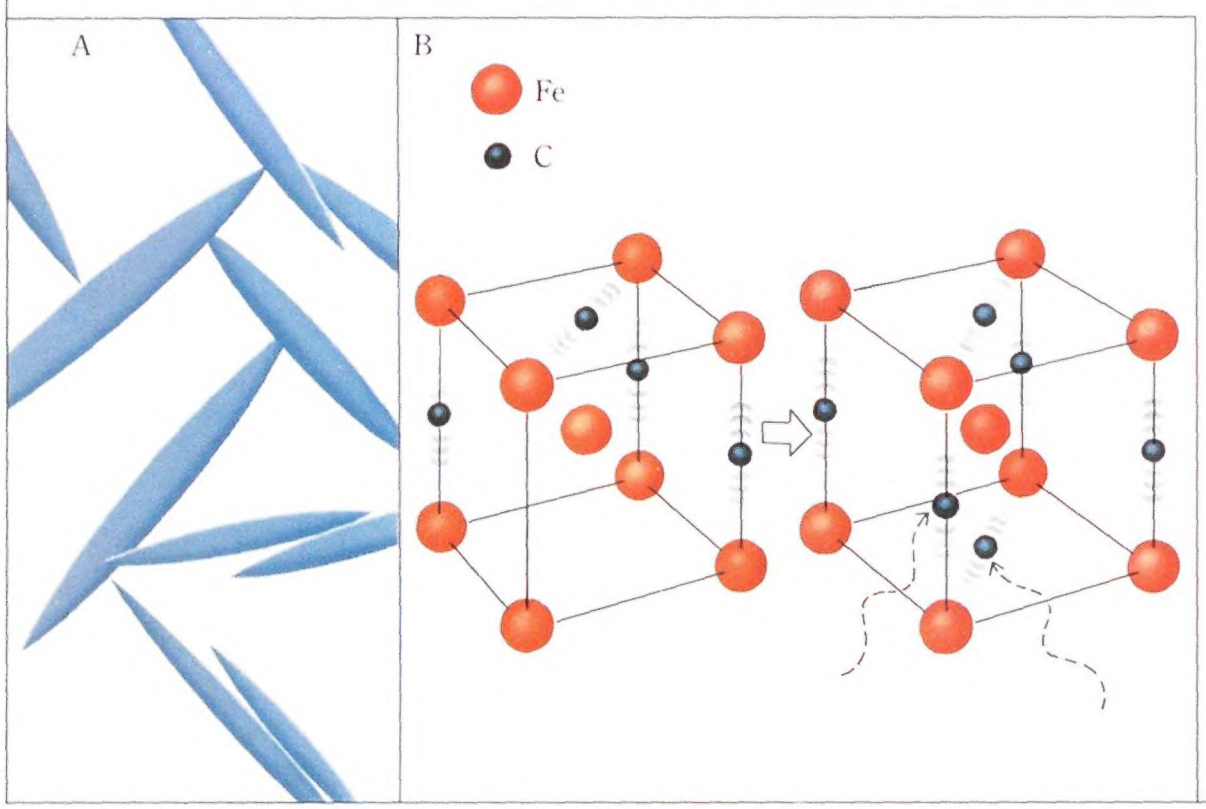


Figure 1: Cumulative acoustic emission counts for Fe-1.3%C steel, and control specimens of SAE 4140 and 304 stainless steel.

Figure 2: Artist's rendering of two proposed sources of microcracking: (A) impingement of the plates during the formation of martensite and (B) carbon atom rearrangement during the aging of martensite.



MARTENSITE is a hard microconstituent of steel which forms when austenite, iron containing carbon in solid solution, is quenched from a high temperature. The martensitic transformation produces steel that is hard and strong, but non-ductile. Through heat treatment, the steel can be tailored to applications requiring different degrees of ductility. High-carbon martensite—a highly stressed microstructure with a plate-like morphology—contains microscopic ruptures or separations 10 to 20 microns in length. These structural discontinuities, termed "microcracks," influence the mechanical properties of steel.

Although aspects of the microcracking phenomenon have been understood by metallurgists for more than fifty years, there is still no definitive explanation for when or how it occurs. An engineer at the General Motors Research Laboratories has devised an experiment that detects the microcracks as they occur.

The elastic energy released when microcracks form should produce a stress wave and associated high-frequency acoustic emission (AE). Using a piezoelectric transducer as the monitoring device, Dr. Michael Shea set out to determine what could be learned about the microcracking process by measuring AE.

The more widely accepted of two current hypotheses—the "impingement model"—asserts that microcracking is transformation-induced, taking place due to the collision of martensite plates during the quench. The other model maintains that microcracking occurs during the aging of martensite after the plates have already formed. The "aging model" suggests that thermal activation enables carbon atoms to rearrange themselves, producing localized stresses high enough to cause microcracking. Dr. Shea's ongoing research into high-carbon martensite led him to believe that the aging hypothesis was important. He proceeded to determine if AE is produced during aging.

For his study, Dr. Shea chose Fe-1.3%C steel, which undergoes martensitic transformation during quenching and is known to form

microcracks. To provide baseline data, control specimens of 304 stainless steel and SAE 4140 steel were put through the same procedures as the test composition. When quenched, 304 stainless steel produces no martensite, and SAE 4140 forms a low-carbon martensite which has a lath-type morphology, and generally does not microcrack.

SPECIMENS of the three compositions were quenched to −196°C and then slowly heated to room temperature. Acoustic measurements were made beginning at 0°C, at which point carbon atom mobility is sufficient to allow rearrangement processes to take place, and continued for 45 minutes after the specimens had reached room temperature. No AE was recorded for 304 stainless steel, and only a slight amount for SAE 4140. Significant emission, however, was measured for the Fe-1.3%C steel specimen during the entire testing period (see Figure 1). Since martensite had already formed during the quench, these results support the hypothesis that microcracking is produced during aging of the freshly-formed plates. Dr. Shea ruled out both slip and twinning as sources of AE since the literature indicates that neither factor is significant during aging of martensite below 40°C. The possibility that the AE resulted from isothermal transformation of austenite to martensite could also be excluded because this process does not take place in the composition studied.

"These results demonstrate conclusively," says Dr. Shea, "that microcracking occurs during the aging of high-carbon martensite, thereby providing support for the less accepted of the two models.

"The next challenge," he continues, "will be to quantify the relative contributions of both models—impingement and aging—in an effort to determine which, in fact, is the more important mechanism, thus furthering our understanding of microcrack formation. Then, perhaps, we can more systematically explore ways to minimize microcracking."

General Motors

GM

MARK OF EXCELLENCE

THE MAN BEHIND THE WORK

Dr. Michael Shea is a Staff Research Engineer in the Metallurgy Department at the General Motors Research Laboratories.

Dr. Shea received his undergraduate and graduate degrees in metallurgical engineering from Michigan Technological University, and his Ph.D. in materials engineering from Rensselaer Polytechnic Institute. His thesis concerned deformation and fracture of cesium chloride type superlattices. He joined General Motors in 1971.

The areas of metallurgical research pursued by Dr. Shea at General Motors include the mechanical properties of high-carbon steels, mechanically-induced transformation of austenite, and structure/property relationships in nodular cast iron. His exploration of the microcracking phenomenon in martensite was conducted with the help of instrumentation developed by GM colleague Dr. Douglas Harvey.

The view from the castle

The U.S. exhibit at the great horticultural fair in Munich is a typical 19th-century American garden, created by the Smithsonian

This year the Smithsonian has embarked for the first time on an international venture in horticulture. It has created an "American Garden" for the International Horticultural Exhibition in Munich, which opened at the end of April and will run through October 9. This happy circumstance came about because Mrs. Honoré Wamsler, an American garden enthusiast who lives in Bavaria, was distressed that there were no plans to have her native country represented in IGA 83 (an acronym for *Internationale Gartenbauaustellung*, and less of a mouthful).

Mrs. Wamsler appealed to various agencies in Washington, pointing out the benefits to be derived from U.S. participation in this group effort. But without success—until she approached the Smithsonian. We then explored the questions of how we could worthily represent American horticulture amidst the dazzling displays of so many other countries and how the effort could be funded.

The task fell to the Institution's Office of Horticulture, which—under the able direction of James R. Buckler—has been responsible in a multitude of ways for beautifying our exterior grounds and interior exhibits, and for displaying our very large orchid collection to embellish the halls and delight visitors.

Our contribution to IGA 83 is an ambitious one, supported by gifts of private funds and thus an example of creative voluntarism operating in a government-related institution. This project, planned by Mr. Buckler and coordinated by Kathryn Meehan, occupies a plot of more than half an acre in the exhibition grounds, and includes typical elements of American gardens from the last half of the 19th century. It has cast-iron urns planted in the exuberant manner of the times, cast-iron benches, and lampposts fitted with hanging baskets overflowing with flowers and decorative foliage. They flank brick pathways lined with beds of native American flowers such as goldenrod (long a favorite border plant in Europe). And there are the inevitable parterres of bedding plants, one of which is a replica of the Smithsonian seal.

Such a garden would not be complete without a summerhouse. Ours in Munich was copied from one still standing on the grounds of the U.S. Soldiers' and Airmen's Home in Washington.

The IGA was developed in Western Europe after World War II as an educational project to promote the creation of green spaces in formerly blighted urban areas. The member countries take turns playing host, in a ten-year cycle, to the annual exhibition, although nations around the world participate with exhibits. It is a noble effort, arousing in the garden-minded citizen ambitions to create miniparks, recreation areas or hydraulic systems for water and bog gardens, and to organize displays of new garden flowers and vegetables. Such efforts to reclaim inner-city land, often war-damaged, have been widely successful in Western Europe.

This international horticultural fair, with our own exhibit—which was awarded second prize, a rare honor—should not be missed by Smithsonian Associates traveling in southern Germany this summer, for few things revive the spirit like the beauty of gardens.

S. Dillon Ripley

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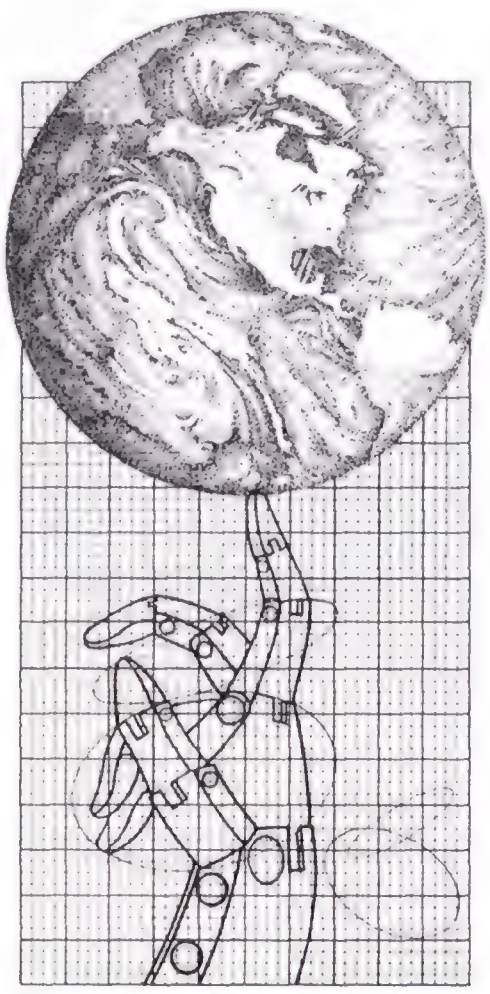

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Letters to the Editor

Birth of the Universe

Dear Sir: In his fascinating article James Trefil says "We in the 20th century have constructed our own creation epic, using the language of science. . . ." It seems to me that cosmology deals with the evolution of physics once the Big Bang commenced. Creation, properly understood, deals with the period before Time Zero, not after. Who or what caused matter to be, and brought about the Big Bang?

Twentieth-century science is doing a poor job when it purports to replace ancient creation epics, including Genesis, which deal with the questions of who is responsible, what is the meaning of the Universe and what is Man's role in it. Whether modern Man accepts the answers is another matter, but at least the epics raise these vital questions.

I think it is a wonderful accomplishment of science to be able to reconstruct the early workings of the Universe, but until cosmology can get to a point before Time Zero, I feel Genesis will continue to be relevant. It provides answers to questions that modern cosmology is even reluctant to ask.

Michael R. Hoyt
Silver Spring, Maryland

Dear Sir: Professor Trefil is to be commended for making the birth of the Universe not only understandable, but downright exciting to the layman. But I suspect that Michael Freeman's photographs were only the basis for illustration. Surely we may know the name of the artist who represented these elusive critters so well.

Peggy King
Los Angeles

Michael Freeman's pictures were completely photographic with one exception: only the quark was computer-generated, by Mel Pruitt of Los Alamos National Laboratory. True, it was not conventional photography but an exotic combination of unlikely objects and imaginative techniques: for example, a tiny light mounted on a toy locomotive moving on a curved track set on black velvet in a dark room created the electron; a special arm with a tiny light mounted on a phonographic turntable, an orbiting electron; and spinning ball bearings sprayed with a dulling finish and photographed on the moving turntable, protons and neutrons. Images were superimposed to create the finished photographs; one panel in the foldout is an assemblage of 33. Ed.

Stream doctor

Dear Sir: You restore my faith that some of us can and will pay to save nature.

For those landowners who have sick trout streams but cannot afford to hire Rich McIntyre to work his miracles, do not despair. Contact—and join!—your local chapter of Trout Unlimited. This conservation group works to preserve and restore cold-water resources, and the cooperation of landowners is essential. Here in Wisconsin many thousands of man-hours of labor have been donated by TU members for trout habitation improvement projects such as installation of cattle crossings, stream-bank stabilization and fencing. If we all keep working hard, perhaps we will succeed in making our Earth fit for both trout and people.

Colleen F. Surber
Madison, Wisconsin

Winterthur Museum

Dear Sir: Mr. Olmert's description of the Montmorenci spiral staircase at Winterthur reads, "That this example of neoclassical elegance could be plunked down in backwoods Carolina—so far removed from New York, Philadelphia or Charleston—seems indeed miraculous."

Mr. Olmert's research leaves a great deal to be desired, as does his flip writing. North Carolina was, it is true, among the poorest of the Southern states, but there were always areas of education, culture and wealth. A cursory investigation would have shown him that Warren County, where Montmorenci was located, was,

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from the 18th century, one of these areas.
Lucy Boyd Meade
Lynchburg, Virginia

Indian Stream Republic

Dear Sir: Edwards Park's otherwise fine article says the town of Pittsburg is unaccountably pronounced "Pitchburg."

Now there are many things about Pittsburg—including some of my relatives—that are unaccountable, but pronouncing Pittsburg as "Pitchburg" isn't one.

As a matter of fact, the only accountable thing in Pittsburg is the death rate. It's still one to a person.
Richard Freeman Leavitt
Miami
Mr. Park, who was raised in Hillchborough County, New Hampshire, says he was told that up in Pitchburg you had to keep your witch about you or those unaccountable woodsmen would take their akches and hack you to bitch. Ed.

Jackson Laboratory

Dear Sir: We regret that we identified incorrectly the photograph of the mouse pictured on page 117 of your May issue. It is a black-eyed white mouse of the W mutant stock that carries an inherited anemia, not an albino mouse.
James A. Baldwin jr.
Director, Public Information
The Jackson Laboratory
Bar Harbor, Maine

Dear Sir: Mr. Wolkomir tells us that some of these aristocratic mice have pedigrees stretching back "2,000 generations . . . the equivalent for humans, of 6,000 years." He adds that "future geneticists . . . may wish to perform experiments that today's scientists cannot conceive."

Using his figures and my old math, I get just *three* years for one human generation. Most of today's scientists are well past that age. Is that why they cannot conceive? Or should that read "200"?
Kenneth Phillips
Portland, Oregon
Unfortunately, an extra "0" snuck onto our 200 and was not removed. Ed.

Canes

Dear Sir: My great-grandfather felt that a true gentleman prized three things: a white silk handkerchief, a good pocket-knife and a "walking stick." In his later years, if he felt "dauncy," he would set forth equipped with all of the above to "walk a section."

Perhaps he was assisted by the fact that his walking stick, which I prize today, holds a glass vial under its removable handle large enough to contain a serviceable "nip."
Timothy Evans
Washington, D.C.

Andrée expedition

Dear Sir: One correction in your enjoyable article on the ill-fated Andrée attempt to reach the North Pole by balloon in 1897. The Eagle did not land "about two-thirds of the distance to the North Pole," but covered less than one-third of that distance. The route map in Per Olof Sundman's *The Flight of the Eagle* shows that the Danes Island ascent began about 710 miles south of the Pole. True, the Eagle's zigzag path took it well in excess of 500 miles, but the flight ended only about 220 miles north of takeoff point, barely 31 percent of the attempted flight.
Harry W. Trimble, Lt. Col. USAF (Ret.)
Sumter, South Carolina
Colonel Trimble is correct. Ed.

Dear Sir: Mr. Kahn has written a very interesting article, but I was a little astonished when I read your picture credits. The photograph on page 127 was taken, not by Mr. Kahn, but by me.
Lars-Olof Lothwall
The Swedish Film Institute
Stockholm

Fortune cookies

Dear Sir: Most Bell Lab-developed UNIX computer-operating systems have a "fortune cookie" program that flashes on a random selection of pithy sayings from its file when the operator starts it up. Among my favorites are: "A diplomat is someone who can tell you to go to hell in such a way that you will look forward to the trip"; "Blessed are they who go around in circles, for they shall be known as Wheels"; "Keep emotionally active. Cater to your favorite neurosis"; "You may be recognized soon. Hide"; "Avoid reality at all costs"; "A closed mouth gathers no foot."
A. G. Gann
Bedford, Massachusetts

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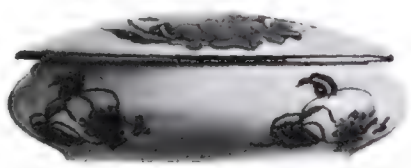

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Around the Mall and beyond

Roslyn Walker stands next to ritual mask.

About halfway through this month Margaret Truman's new murder mystery will be published by Arbor House. She has previously written *Murder in the White House, Murder on Capitol Hill* and *Murder in the Supreme Court*. And now comes—you guessed it—*Murder in the Smithsonian*.

It won't win any Pulitzers for Margaret (though I hesitate to say so lest her father descend from his Presidential Valhalla and sock me right in the chops), but it's sort of good fun to read about our familiar places and even our real people. The author blends actual characters into her fictitious cast—a nice touch. A big figure in the plot, for example, is the Director of the Museum of American History, recently hired "to replace Roger Kennedy." I didn't get a chance to talk with Mr. Kennedy about this, but the last I heard he was still happy in the job.

I did call Margaret Klapthor, however, whom the author mentions (quite rightly) as a "renowned curator" in that museum. Mrs. Klapthor said Margaret Truman hadn't talked to her, but that she's good about facts when it comes to Washington's establishments, including the Smithsonian. Mrs. Klapthor also assured me that she couldn't recall a single black-tie reception at the Museum of American History during which the guest of honor slumped over the railing overlooking the Foucault Pendulum and landed, splat in the middle of that ring of little red markers, with an antique sword fatally thrust into the back of his dinner jacket.

I confess to a lot of sympathy for anyone who writes a book about the Smithsonian, since I am struggling to finish one as I write this. There are an awful lot of facts to get wrong, and navigating through them is pretty demanding for Margaret Truman and me. But there are some rewards. Recently I got to meet Roslyn Adele Walker, curator at the National Museum of African Art. That's sort of an accomplishment because Roz Walker is a researcher and scholar who leans toward seclusion. She's no glad-hander, no tour guide all primed to greet you and lead you through the African collections. But if you're lucky enough to tag along when she does wander through the exhibits, you'll get a matchless tour.

The reason is that she was married to a Nigerian, lived in Lagos and Ibadan and was accepted by the culture of this part of Africa, as she says, "on some days." When you get her going about it you know you've come across a rare perspective on a distant and unfamiliar place.

Walker is a tall, slim woman who walks as though she came from the country—long, swinging steps. I went to meet her at the front door of the Museum of African Art, and she came out, wading through a large class of kindergartners, looking like a 12-meter yacht in a fleet of dinghies. She looked back at them as she curled herself into a taxi. "You should never teach more children than you can get into a station wagon," she said.

Roz has a nice, soft Memphis drawl. "Yoruba women," she said, "are usually addressed as 'Madame' and spoken to very formally. When foreign visitors addressed

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me that way, I'd let them go on, and then I'd answer in west-Tennessee *Suhth'n*."

Actually, the accent is pretty cosmopolitan. When she was 14 she moved to Baton Rouge, and all her friends there had, as she put it, "names like Beauregard, which were like a foreign language to me." She'd no sooner adapted to that than she went off to college at Hampton Institute in Virginia, where "the speech department tried to turn us all into radio announcers." When she went home no one could understand a word she said. Then there was Indiana University where she picked up some Midwestern, and the University of Massachusetts where she got a dose of Yankee.

"I really felt I had to see Africa. I was talking about its art and writing papers on it, and I'd never been there." So she got a grant from the University of Massachusetts to go to Ghana. Before leaving, however, she met the head of Nigeria's Federal Department of Antiquities and the Nigerian National Museum, who, after succumbing to the Walker mixture of charm and persistence, admitted that he had an opening for a registrar. She then got permission from the grants people to switch to Nigeria and took the job.

Lagos seemed like any urban capital at first because Roslyn saw mostly the interior of her office—desks and filing cabinets that might as well have been in Washington. But her job required travel, and when she moved around the city and the countryside beyond she was delighted and surprised. "But then," she said, "I suppose I would have been surprised at Akron, Ohio."

That first visit was only for a summer. She went back again two years later to do field research. Then she married the son of a very wealthy and important man.

Now the symbolic carvings—totemlike house posts and personal altars—that Roz had considered interesting art took on new meaning in her life among the Yoruba. Instead of noticing how African carvings depicted certain gestures, she was seeing those very gestures on the street. Instead of making detached notes about the importance of palm wine in Yoruba society, she was occasionally drinking it. On one occasion, the celebration of the Nigerian Museum Society's first anniversary and coincidentally her own birthday, she downed some newly fermented stuff before leading an impromptu tour through the Nigerian National Museum and was congratulated afterward for having been so brightly entertaining. She was glad her guests felt that way because she couldn't remember what she'd said.

Her museum work, of course, led Roz beyond just the Yoruba masks and figures. Articles from the Islamized peoples of northern Nigeria, as well as from other African countries, broadened her knowledge immensely. And her private life in the Yoruba community added a new dimension. In time she became very good friends with both her mother-in-law and her father-in-law and every Thursday she would get together with the former to eat moin moin and drink Dubonnet. "Moin moin is the only civilized way to eat legumes," she said. "It's made of African beans—small red beans—or of black-eyed peas."

Roz would walk alone along the streets. That was a bit unusual for someone of social distinction, which she was. People used to stop and offer her rides.

"I was so damn democratic," she remembers now. "But then, so was my

mother-in-law. Yoruba women are very independent and own property in their own names. But I was a foreign wife, so I had to be sponsored by my husband."

There were many differences, of course. "When you greet a friend, you ask how he or she is, and then you have to ask about all the members of the household. And the answer always has to be 'just fine.' "

Also, there was the interestingly different fact that Walker's mother-in-law was one of several wives. "She was the first, though. First of—I don't remember exactly—five plus."

Inevitably, the question of the *Roots* syndrome arose. Did she feel a sort of genetic magnetism when she arrived in Africa? No, says Roz, because she wasn't looking for that. "Either you arrive in Africa ready to embrace everything—people get off the plane and kiss the ground—or you carry along some skepticism."

People are raised differently in different lands and the bridge isn't easy to cross. "I used to think, if these are my people, why can't they eat corn bread? I was always trying out recipes to see if I couldn't get this Nigerian family of mine to eat it. And they would say, politely, 'I don't think I know how to eat this' (which in Yoruba society is a polite way of saying 'I don't like it')."

In 1975 Roz returned to the States to academe. She traumatized an American car dealership by buying a car over the telephone. No fuss, no haggling, just make it yellow, or red as second choice.

Warren Robbins, longtime director and guiding light of the Museum of African Art, had been keeping an eye on this irrepressible lady, and, in 1982, he snatched her up. She is still hankering for a doctorate, feeling she owes that to her ancestors. As she puts it, "Someone's smarts are coming through."

Lunch ended, and we walked back to the museum. I had to stretch my legs to keep pace with her. I asked her about more travel. "I'd like to visit Cameroon, Senegal, Kenya, places like that where all I've seen was the airport. But not yet. I want to be in on the move to the Mall."

The move will put the Museum of African Art right next to the Arts and Industries Building on the Quadrangle. By then I'll have a lot more questions for Roslyn Walker.

Edwards Park

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Phenomena, comment and notes

Not all life runs on human rhythms. When time "flies," we sometimes see worlds much different from our own

This old world is slowing down, and so am I. The Earth's decline is so well measured that the U.S. Naval Observatory here added a full second to 1983 on the last day of June, to keep our clocks in time with the planet. What slows the Earth is mostly tidal friction: all that salt water sloshing around twice a day. The day has become two hours longer in just the last 150 million years. For reasons not obvious to me, the rotational momentum lost by the Earth is transferred to the moon. It cannot spin any faster because one side is locked toward us, so it moves farther away and sweeps out in a larger orbit. We are getting longer days, but eventually we are going to lose total solar eclipses. The moon will appear too small to cover the sun.

I can use the extra second. In fact, I could use a lot more. What I really want is an extra month or so, right now, not another hour a day 75 million years from now. But I don't suppose that pressing a few dollars into the right hands would do any good.

My own sense of time seems to be splitting, abandoning the center for the extremes. On the macro level, time is going by so fast that the world is a blur. Seasons go by as quickly as days used to. I glance at the paper on a rainy April morning and look up in time to see the sun set after a hot June day. The car is going too fast, but there is no driver to dissuade. On the micro level, the opposite occurs. I stride down the sidewalk at a brisk city pace, and feel it takes hours and hours to get to the corner; I've fallen into some relativistic world in which time is dilating. It all probably has to do with aging, with neurons dying like shad at the end of their run, but it gives a plodding mind an excuse to shift into high.

When I go to "my" marsh on weekends, I try to see it on as many different time scales as I can, like looking at it through a zoom lens that I can continually adjust to change the distance scales. Some things happen in "normal" time: at dusk a muskrat swims out of a marsh channel into the chop of the open river, moving with the no-nonsense economy of a workboat going out to sea as the pleasure boats come splashing in for the night. Or an osprey gets its angle and dives, and the moment is gone.

It is other velocities of time that I try to feel, the ones that require more than an hour's stroll—or a human lifetime. The tides rise and fall invisibly, so gently it is difficult to think they slow the Earth. I stare at a slab of concrete in the water ("Duck Rock" on my mental map) and strain to see the water rise. A pebble in the conglomerate is my marker. But it always happens when my eye blinks: one second the pebble is dry, the next it glistens wet. For me the cycle from high tide to high tide takes about 13 hours. For this great hump of mud in front of me, as full of life and as shiny as the swollen abdomen of a queen termite, the tides may be the systole and diastole of its circulation, and 72 high tides make one of its minutes as 72 heartbeats do one of mine.

Just as I cannot see the tides move, even when they trap me out at the end of the point, I cannot see the plants grow. Green reeds shoot up through the dead stalks of last year; wildflowers wink into existence along the trails. Time-lapse photography of flowers opening is familiar, revealing motion we could not otherwise see. But I want to see more.

Images from an article on tropical vines we published in March 1979 haunt me still. Thomas S. Ray jr. described vines germinating on the forest floor, snaking along the ground until they encounter a tree, and then climbing the tree until they reach the light they need to flower. If the tree encountered is not tall enough to reach the light, the vines turn right around, go back to the ground, snake along it until they encounter an-

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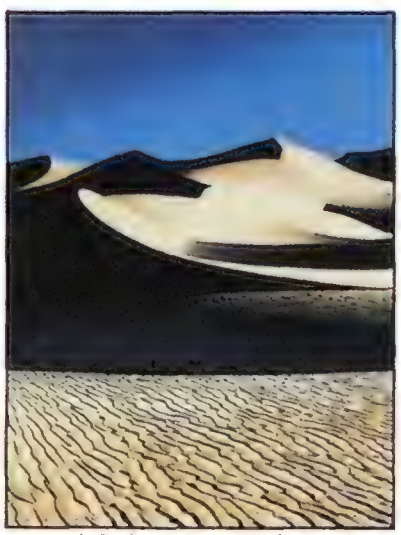

Antonio Peticov's *Desert Nights*, original serigraph. Signed limited edition of 195.

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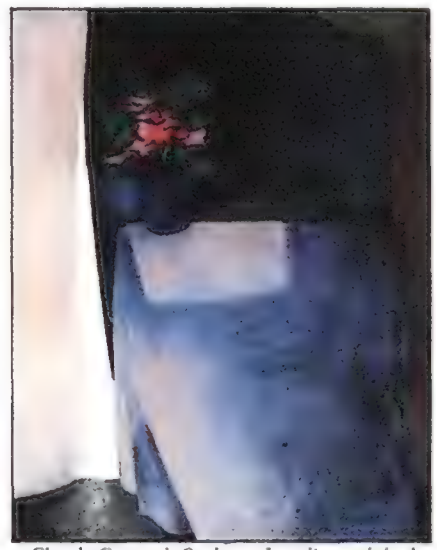
Ray Vinella's *Passing Storm, Taos, N.M.*, original serigraph. Signed limited edition of 300.

Fernando Torm's *Poppy*, original etching.
Signed limited edition of 195.



Claude Gaveau's *Ombre et Lumière*, original lithograph. Signed limited edition of 175.

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other tree, then try again. No part of the vine actually moves: the front end keeps growing while the back end keeps dying off. Any given part of the vine is stationary, one definition of a plant, and yet the organism manages to move. If we could accelerate time, we would see the vines moving through the forest like so many green, leafy snakes. Lacking that power, we can try to alter our perception of time. If it happens accidentally, as has been the case with me recently, perhaps we can learn to induce it.

I want to achieve the time sense of a sycamore that might live 600 years along the shore, and feel the seasons come and go like so many days and nights. Years might be as days, alternating light and dark, warmth and cold; perhaps then only the fierce storms that come once in a generation might stand out enough to mark the passage of time. Then I might see the vegetation move, rising on the incoming tide of spring and falling back on the ebb in autumn. I might see the marsh itself move as mud flats become solid ground and river sediment makes new marsh.

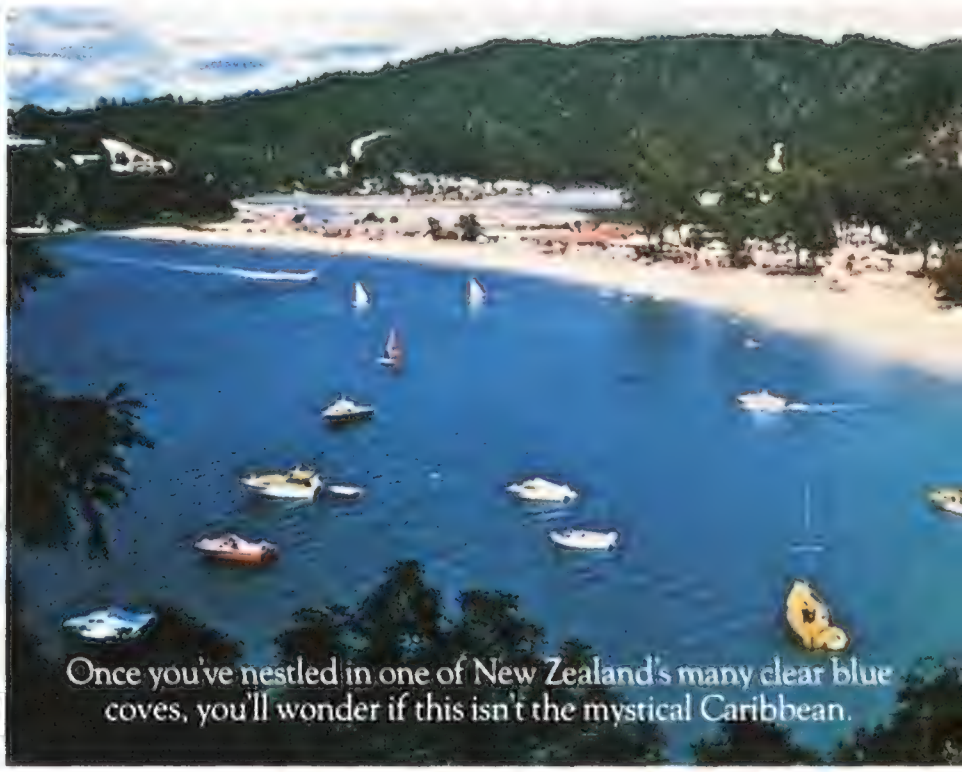
A heron flies up the river, and my mind sees another heron sailing over the same river a thousand years ago with that identical grace and imperturbability. I work to follow the bird through time, to capture some small sense of what Aldo Leopold felt watching cranes land in a Wisconsin marsh:

". . . Our appreciation of the crane grows with the slow unraveling of earthly history. His tribe, we now know, stems out of the remote Eocene. The other members of the fauna in which he originated are long since entombed within the hills. When we hear his call we hear no mere bird. He is the symbol of our untamable past, of that incredible sweep of millennia which underlies and conditions the daily affairs of birds and men.

"And so they live and have their being —these cranes—not in the constricted present, but in the wider reaches of evolutionary time. Their annual return is the ticking of the geologic clock. Upon the place of their return they confer a peculiar distinction. Amid the endless mediocrity of the commonplace, a crane marsh holds a paleontological patent of nobility, won in the march of aeons, and revocable only by shotgun. The sadness discernible in some marshes arises, perhaps, from

Once you've seen one country, you've seen them all.

Once you've taken a ski plane ride onto New Zealand's spectacular Tasman Glacier, you'll feel like you're in the Swiss Alps.



Once you've nestled in one of New Zealand's many clear blue coves, you'll wonder if this isn't the mystical Caribbean.

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their once having harbored cranes. Now they stand humbled, adrift in history."

Somewhere beneath the mud are the rocks, and they have their own time sense, one in which a marsh or a civilization lasts only a moment. Like molecules of water that evaporate from the sea, float across the sky only to fall as rain, and wash back to the sea again, the rocks have pushed up out of the planet's molten interior through the hole in the bottom of the sea, and are bumping along on top until they plunge back into the warmth from whence they came. Crustal dynamics give us earthquakes (p. 40), and recycle the planet's skin.

Plate tectonics is not the first thing that comes to mind standing in a marsh, and yet the marsh and its birders are sliding west, away from the Mid-Atlantic Ridge. On the theory that what comes up must someday go down, I had once assumed that the marsh—along with the rest of North America—would one day be subducted under some other plate, and the slate would not only be wiped clean but melted down.

Not so, it seems. Continental plates are lighter than oceanic plates, and tend to ride up over the latter. Neither the marsh nor the continent is going to be recycled. We have to live with what we have.

At worst it is pretentious of me to work at seeing the marsh in accelerated time. It can be comical: the reeds spring up and die back in a rhythm that resembles nothing so much as those early black-and-white movies in which people seem to run in quantum spurts. It can be dead wrong, as was my vision of North America going under. And yet there must be some underlying truth to be known, however dimly, if we can learn to tune our perception of time as we do our perception of distance.

At a junior high school concert some years ago, the chorus director brought out a shy boy, younger than his schoolmates, to play the piano. She had accidentally overheard him play once, and wanted us to hear him. He played a classical piece and he played it fast, incredibly fast, faster than anyone I ever heard. He played so fast that great splashes of notes became single tones in their own right, tones that combined to produce a simple, clear melody, a song by itself floating over the torrent of notes bursting from the piano. It was a magical song, one that must have existed in the composer's head, the unwritten and perhaps never-before-heard soul of the composition.

In the marsh, the birds and turtles and dragonflies and I go about our business in normal time. But the tide covering a pebble or a heron flying can split my time sense, and the marsh and life itself move faster and faster. And I sense that a song is being played, a song just out of my hearing, the song of life.

John P. Wiley jr.

A sandhill crane incubates another generation. The wading birds' arrivals in Wisconsin marshes each year were for Aldo Leopold ticks of the geologic clock.

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34

Points of origin

Taking vacations is a venerable idea; changed through the ages, it once meant time monks took off for study

Call the airlines, renew your passport, book space for your pets at the kennel. Do all the things that mean you're about to go on your vacation. But while you're at it, reflect a little on the antiquity of the leave we take so much for granted.

Certainly the institution of the paid vacation in the industrial West is in very good health. On January 16, 1982, the French government under François Mitterrand granted a fifth week of paid vacation to government workers, a tradition begun when Premier Léon Blum's Popular Front government granted French workers a week's paid vacation in 1936.

Around the world it is much the same. In the United States, England and Canada, the average is about three weeks. In Spain, India and Zimbabwe, four weeks. Most West German workers get six weeks off. And to encourage the merrymaking, they are given a vacation bonus—50 percent of their monthly wage. In this way, 39.5 billion deutsche marks are pumped into the nation's travel business.

For all its modernity, the custom of lengthy summer vacations is an ancient and honorable one. A tribe of Indians living near Cape Flattery in Washington State were discovered by 19th-century anthropologists to refrain from work for the whole of the late summer—the equivalent of our month of August. No fish were to be caught, no berries picked. The yam farmers of Benin, in West Africa, were known to rest for the whole first month of the dry season, after the yam crop had been brought in.

By contrast, school vacations are a purely modern concept that is utterly changed from its historical model. Most students today look forward to summer as a carefree and glorious hiatus. But the medieval view of vacation was far different and is still visible in a commentary on the great paradigm of monastic life, the *Rule* of St. Benedict (SMITHSONIAN, June 1980). The life of the monks was full to the brim with prayer and work, whether it was teaching, copying manuscripts, crafts or farming. For the majority, there was little time left over for what we would call "scholarly pursuits."

In about A.D. 845, the commentator Hildemar of Corbie explained the idea of vacation in this way: "*Vacare* means to relinquish one thing and to replace it with some other preoccupation; it is in this sense that he [St. Benedict] insists . . . that, manual work being set aside, the time thus released be used for study."

There you have it. Vacation time, youngsters, is a time to fly to your books. In support of this theme, *The Plan of St. Gall*, the ninth-century master plan for monastic architecture, labels one of its large halls the *domus communis scolae id* [est] *uacationis*. Walter Horn, emeritus professor of architectural history at the University of California, explains the tag as: "the common hall for learning, *i.e.*, for the time relinquished from other obligations for the purpose of study."

This was an attitude that Ben Franklin would have understood. Almost a millennium later, his advice was clear: "Employ thy Time well if thou meanest to gain Leisure; and, since thou are not sure of a Minute, throw not away an Hour. Leisure, is Time for doing something useful."

Although Franklin does not suggest reading, something of that idea is still afoot. As a character in Philip Roth's *Goodbye, Columbus* says, "That's how I know it's summer. My cousin Rhoda starts reading *War and Peace* again."

The idea of paid vacations for nonagricultural workers had to wait for the Industrial Revolution to find adherents. Before that, vacations and leisure time were dictated by the farming calendar.

In turn, the church calendar was attuned to the demands of spring planting and fall harvesting. Although there was no annual vacation as such, holidays were plentiful. In fact, the word holiday was originally *holy day*, a time that was proscribed from work, when people would be better employed in rest, reflection and prayer. At least that was the theory.

But there were two problems. First, there were so many ecclesiastical holidays that they threatened production. An early

Sinners carouse on Saint's Day in *The Peasant Dance*, painted by Pieter Bruegel the Elder about 1567.

continued

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In developing the new Corvette, the objective was to design a high-performance sports car capable of taking a place with world-class exotics like Ferrari, Porsche, Lamborghini, and BMW. We think our objective has been achieved in the new Corvette on display before you. We invite you to inspect it closely. Only when you look beneath the Corvette body will you begin to understand how it performs so remarkably well.

To refer to the new Corvette as an advancement of modern automotive technology is probably an understatement. Many

New clamshell hood creates wide-open service access to engine and front suspension. Note the overhead work lamps.

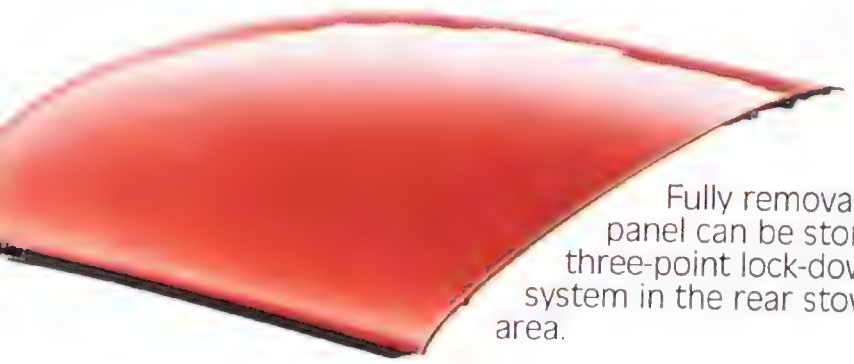
Improved 5.7 Liter Cross-Fire Injection V8 engine. 205 horsepower for quick response and strong, positive acceleration. Parasitic horsepower and torque

The Corvette interior is designed to be the ultimate over-the-road environment for the driver-

NATOMY OF THE WORLD'S ION SPORTS CAR.

facets of the new Corvette reflect all-new technology. New microelectronics are employed to handle the dual function of improving engine/drive-train performance and to create the most sophisticated instrumentation package ever offered in a production automobile. Advanced metallurgy and super-strong aerospace synthetics are combined into the suspension system. And the first production use of a unidirectional tire/wheel combination has helped the new Corvette generate impressive lateral acceleration readings on the GM Proving Ground skidpad. Many developmental improvements for passenger cars of tomorrow are presented today in the new Corvette.

Two new choices of space-age aircraft-style bucket seats. Deeply contoured seats are standard. Pictured in the interior are the optional leather seats. The contours of the optional custom adjustable Sport seat, above, can be power-adjusted almost infinitely to maximize driving comfort and enjoyment.



Fully removable one-piece roof panel can be stored using the three-point lock-down bracket system in the rear stowage area.

The optional Delco-GM/Bose Music System ETR™ AM/FM Stereo with Seek and Scan, Cassette Tape and Clock. A concert hall environment on wheels. Words are not adequate description, you've got to hear it. AM/FM stereo ETR radio with power antenna is standard equipment. (May be deleted for credit.)

Improved 5.7 Liter Cross-Fire Injection V8 engine. 205 horsepower for quick response and strong, positive acceleration. Parasitic horsepower and torque losses are reduced with a new thermostatically controlled electric cooling fan. Engine performance is also enhanced by stainless steel headers and a free-flow dual exhaust system. Front-engine/rear-drive configuration and balanced overall design put Corvette's front/rear weight distribution within a whisker of an advantageous 50/50 balance.

Corvette's all-new suspension, front and rear, is a major technological achievement for a production automobile. Short/Long Arm (SLA) front geometry is designed to keep the wheels at the proper angle for responsive steering as the car moves over undulating variations in the road surface. Corvette's straight-ahead directional sense and stability are improved through a 12-mm offset of the front-wheel spindle.

The Corvette interior is designed to be the ultimate over-the-road environment for the driver-enthusiast. Through the upper half of the steering wheel, you see the most sophisticated instrumentation package ever developed for a vehicle designed to remain on the ground. All critical controls are deployed within convenient reach of the driver. And some of the standard features include air conditioning, power windows, tilt and telescoping steering wheel. Rear hatch can be opened by actuating switches mounted in the center console or at the rear of each door panel.

Liquid crystal displays provide dual analog and digital readout of speedometer and tachometer. Driver Information System lets you program your own instrumentation display with a set of console switches. You can choose: oil pressure or oil temperature; coolant temperature or voltage; mileage range on available fuel or average fuel consumption. More immediate than conventional gages. And surely more informative.

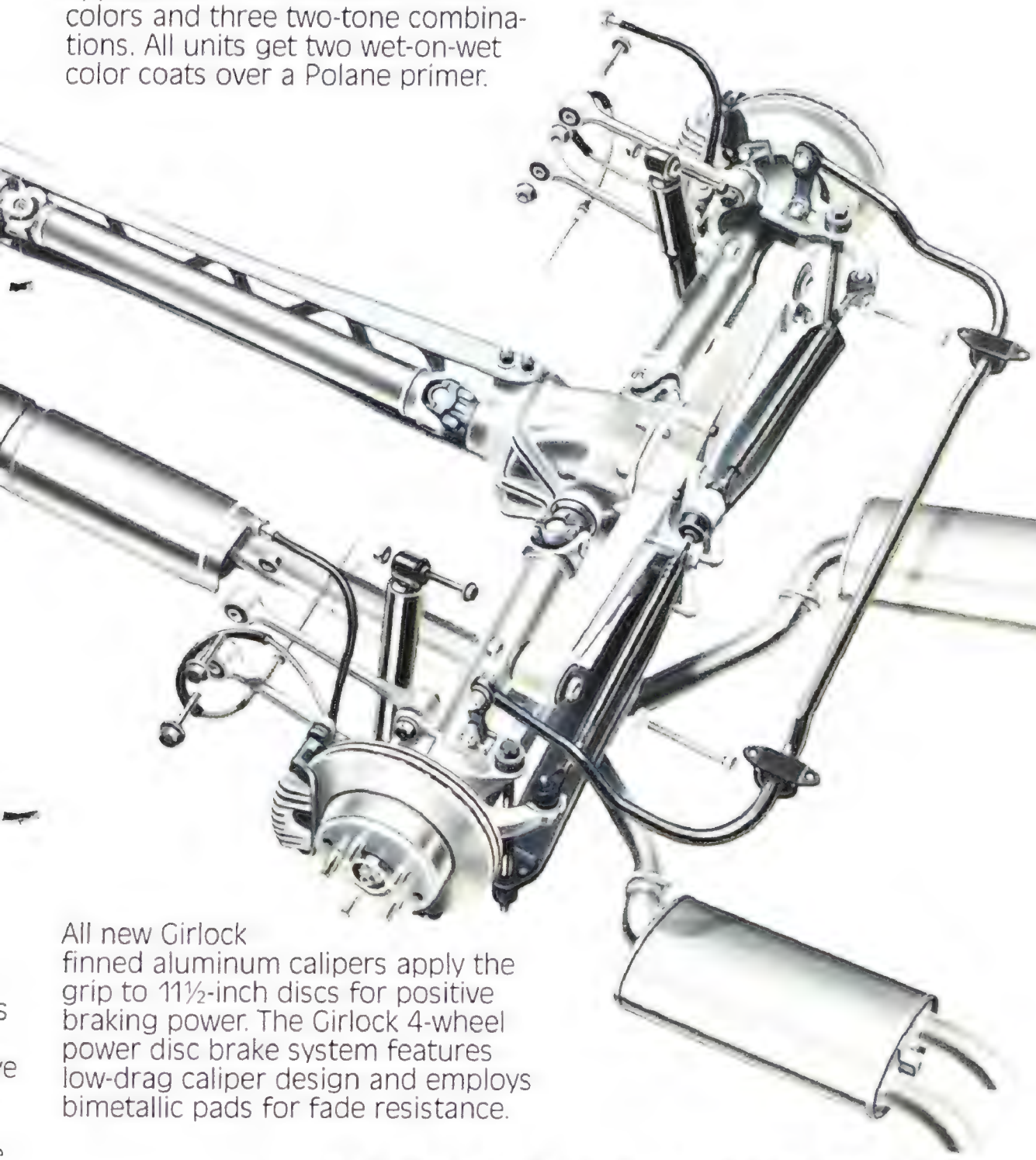
Drive train and rear suspension components further illustrate Corvette's sophisticated use of exotic alloys in achieving a 30% reduction in unsprung mass to enhance the driver's command over the road. With Corvette's precision-balanced weight and the optional Z51 Performance Handling Package, Corvette achieved a remarkable 0.95g lateral acceleration reading on the skidpad at the GM Proving Ground.

Corvette's standard transmission is a 4-speed automatic transmission with overdrive. And available as a no-cost option is a revolutionary new 4-speed manual unit with computer-controlled overdrive in 2nd, 3rd, and 4th gear. In effect: seven forward speeds! Corvettes equipped with the automatic unit and Z51 Performance Handling Package have gone from 0 to 60 MPH in 6.8 seconds on the test track at the GM Proving Ground. The manual unit with 3.31 axle is capable of even quicker times.

Optional Goodyear P255/50VR-16 steel-belted radial tires. The first unidirectional ever developed for a domestic production car. Natural path tread is "pointed" for forward rotation to decrease rolling resistance. Bold footprint and technology from Goodyear's Formula One rain tire create exceptional wet/dry adhesion plus cornering.

Advanced fiberglass finishing and paint application techniques are used to create a rich, lustrous exterior appearance in a choice of 10 solid colors and three two-tone combinations. All units get two wet-on-wet color coats over a Polane primer.

After oven curing, two additional coats of clear enamel are applied to assure a deep, lustrous finish.



All new Girlock finned aluminum calipers apply the grip to 11½-inch discs for positive braking power. The Girlock 4-wheel power disc brake system features low-drag caliper design and employs bimetallic pads for fade resistance.

All-around performance. The objective for the design and engineering of the new Corvette was to create a vehicle capable of producing the high level of all-around sports car performance. This means braking, acceleration, cornering, on-line performance and overall ride. Balance was the key consideration in this comprehensive effort. There would have to be a balanced relationship between engine horsepower and overall vehicle weight; between the rigid structure and the suspension-wheel-tire system supporting it; between sprung and unsprung mass; and in weight distribution on all four wheels of the car.

With the new Corvette, this kind of critical balance has been achieved. When you take to the road, we think you'll agree.

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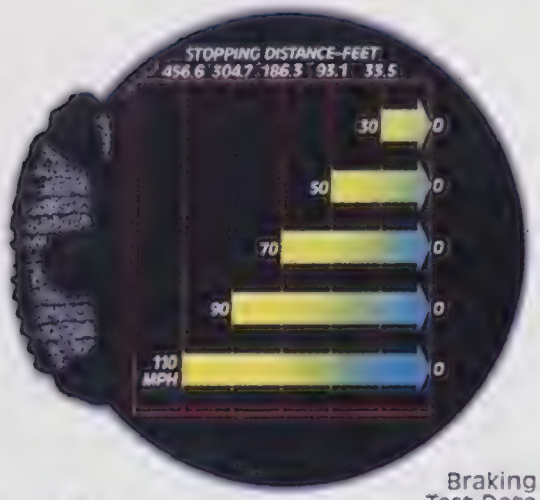


Braking Test Data

Braking

Corvette's all-new 4-wheel disc brake system was developed by Girlock Ltd. of Australia, one of the world's leading manufacturers of high-performance equipment.

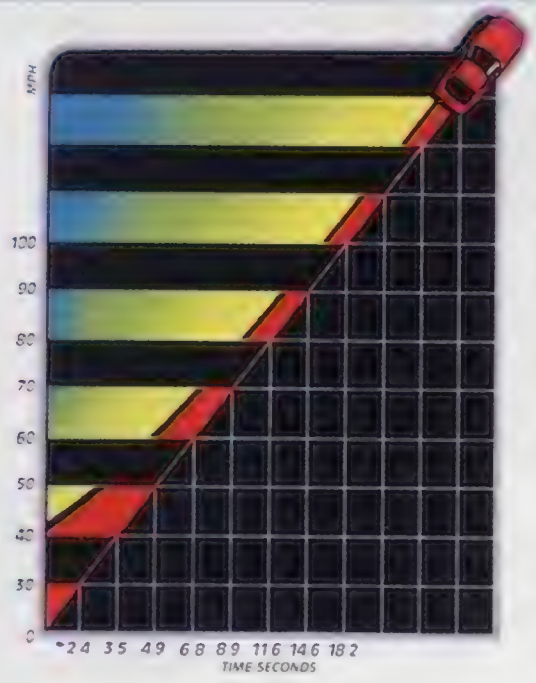
Lateral Acceleration

The critical test of a sports car's cornering capability. This test is conducted on a 108-ft. radius skidpad. The test vehicle is driven up to a maximum speed beyond which it would begin to slide laterally. The "g" indicator refers to the average lateral force generated by the vehicle while at the sustained maximum speed during passes in both directions around the circular course.

In a special test at the GM Proving Ground to determine the upper limits of Corvette's cornering capability, a Z51-equipped vehicle with full-treaded VR tires, 9½"-wide front wheels, and special negative camber settings achieved a sustained average reading of 1.01g. At 1.0g, a vehicle's tires and suspension are encountering a lateral force equal to the full weight of the car.

Acceleration

From zero to whatever speed takes but a few seconds in the new Corvette. Just a scant few of the world's exotic sports cars can better our acceleration numbers—and only by the narrowest of margins. The acceleration

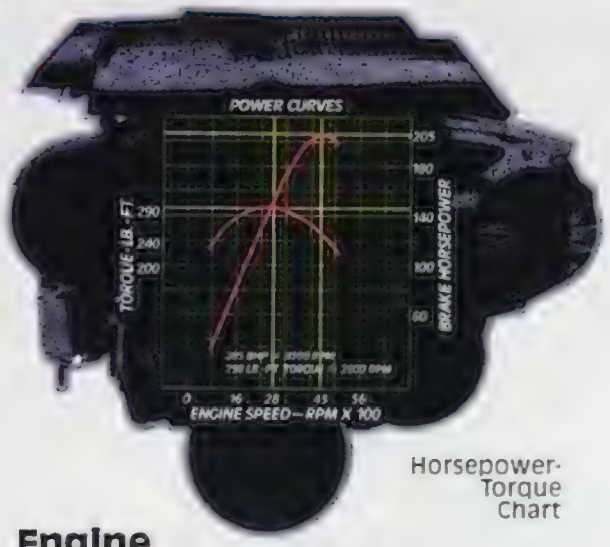


Acceleration 4-Speed Automatic/(opt.)3.31 Axle

chart provides data for a new Corvette equipped with 4-speed automatic transmission and optional 3.31 rear axle (interim availability). The optional 4-speed manual unit can move Corvette along a bit quicker.

Dimensions and Weights

Exterior
Width:
Front Tread . . . . . 59.6"
Rear Tread . . . . . 60.4"
Overall Width . . . . . 71.0"
Length:
Wheelbase . . . . . 96.2"
Overall Length . . . . . 176.5"
Height:
Total Vehicle . . . . . 46.7"
Rocker to Ground . . . . . 7.1"
Min. Ground Clearance . . . . . 5.0"
Interior:
Head Room . . . . . 36.4"
Leg Room . . . . . 42.6"
Shoulder Room . . . . . 54.0"
Hip Room . . . . . 49.3"
Cargo Volume Index . . . . . 17.9 cu. ft.
Curb Weight . . . . . 3,192 pounds
Includes standard equipment as designed with oils, lube, coolant and full fuel capacity.
Distribution:
Front—1,630 lbs. (51%)
Rear—1,562 lbs. (49%)



Horsepower-Torque Chart

Engine

V8 Engine . . . . . 5.7 Liter (350 Cu. In.)
Block . . . . . Cast Iron
Pistons . . . . Forged Aluminum
Camshaft . . . . . Cast Iron Alloy
Bore . . . 4.00"; Stroke . . . 3.48"
Horsepower . . 205 @ 4300 RPM
Torque . . . . . 290 @ 2800 RPM
Transmissions
Standard 4-speed automatic with overdrive and high-stall torque converter
Ratios:
1st 3.06:1
2nd 1.63:1
3rd 1.00:1
4th 0.70:1
Optional 4-speed manual with computer-controlled overdrive in 2nd, 3rd, and 4th gear
1st 2.88:1
2nd 1.91:1
3rd 1.33:1
4th 1.00:1
O.D. 0.67:1

A fifty-eight page, full-color Corvette booklet is available at your Chevrolet dealer's.

There's much more to be shown and said about the all-new Corvette. For the full story, you'll want a copy of the beautifully detailed booklet on the new Corvette—available now through your Chevrolet dealer.

GM

CHEVROLET IS TAKING CHARGE

Chevrolet

writer quoted St. Chrysostom's observation "that piety should not trespass upon industry, nor industry upon piety."

In 1536, Henry VIII tried to compress the number of English holidays as follows: "All those feests or day holydays . . . from the fyrst day of July unto the 29 day of Septembre . . . shall not be kepte or observed from henceforth as holydayes, but that it may be lawful for every man to go to his work or occupacyon upon the same as upon any other workyeday, excepte alwayes the feests of the apostles, of our blessed Lady, and of saynt George."

The second complaint about holidays was that they were often filled with violent or "lewd" (meaning low-class or indecorous) games. Football, cards and dice are commonly mentioned. These distractions, as well as an abundance of food and drink, led to a riotous atmosphere that eventually called for special laws designed to protect Sundays and holidays. The so-called Peace of Sunday, observed at Chester (1086) and Manchester (1301) and other cities, greatly increased the fines for bloodshed or waylaying from Saturday noon until Monday morning.

In April 1450, the bishop of Worcester forbade holiday woodcutting and "dishonest" sports under pain of excommunication. Although the cult of the saints lost much of its intensity among Protestants at the time of the Reformation, the secular observance of saints' days with raucous festivals was a source of annoyance in both Catholic and Protestant lands for centuries. In 1640, the writer Barten Holiday addressed the English Puritans in this way: "Tis not my person, nor my play,/But my sirname; Holiday,/ That does offend thee, thy complaints/ Are not against me, but the Saints."

The indefatigable promoter of secular holidays in England was Sir John Lubbock, the sponsor of the Bank Holidays Act of 1871, which established the first legal holidays. Through a series of bills over the next quarter-century—the Holidays Extension Act (1875), the Shop Hours Regulation Act (1886) and the Early Closing Act (1904)—Lubbock managed to push the employers of the Industrial Revolution into the 20th century.

As thanks for that benefice, a grateful English public conferred a special title on those first bank holidays, one that conjured up a sense of medieval merriment. They called them St. Lubbock's Days.

Michael Olmert

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By Richard L. Williams

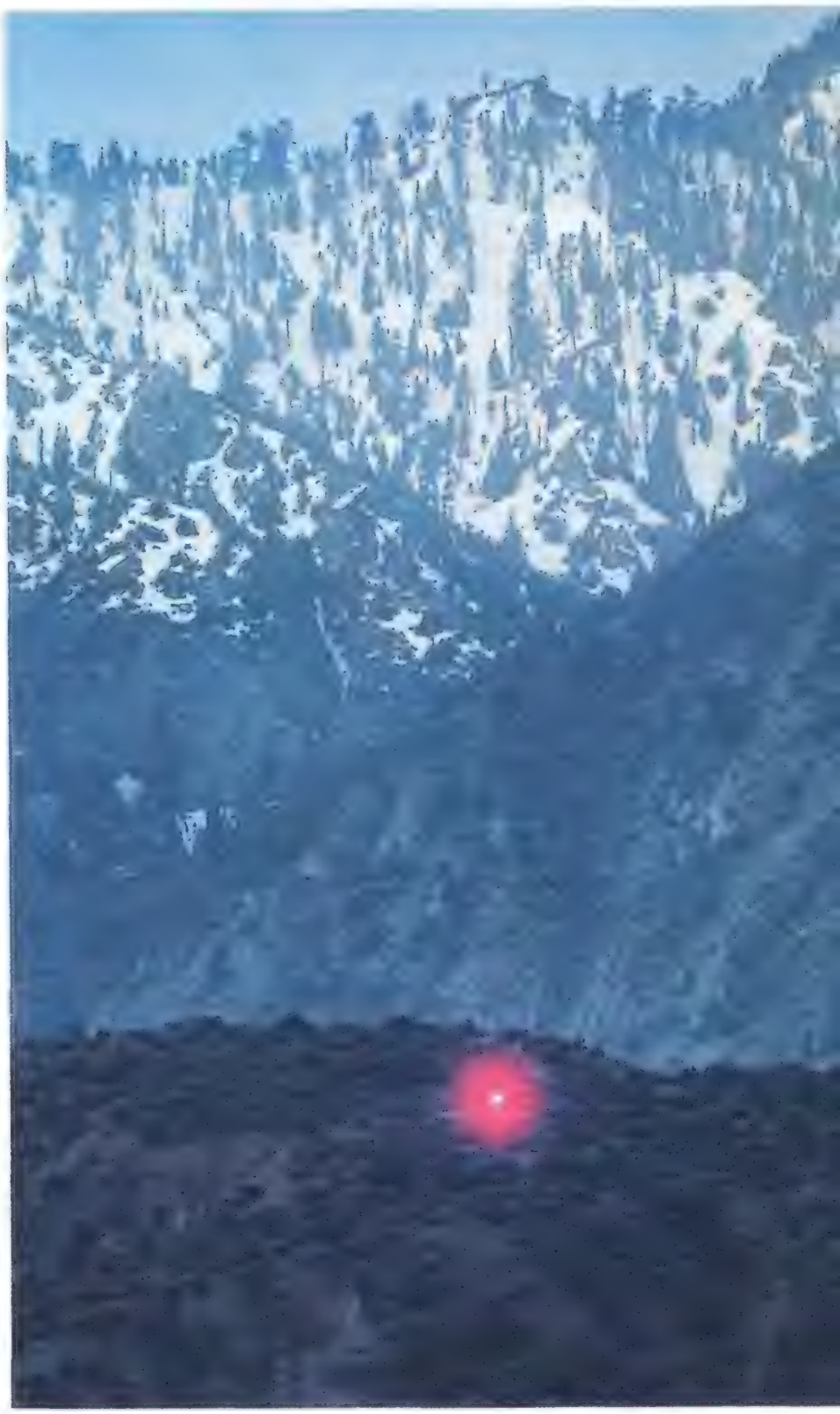
Science tries to break new ground in predicting great earthquakes

Geophysicists follow every lead, the latest technology and oldest folklore, as they strive for forecasts that will avert disaster

Haicheng is an industrial city of 90,000 people in north China, east of Beijing and north of the Liaotung peninsula. On the evening of February 4, 1975, the temperature was well below freezing, but hardly anyone was snug at home. Instead, people were shivering in open-air shelters, watching the flickering shadows of outdoor movies as though it were summertime.

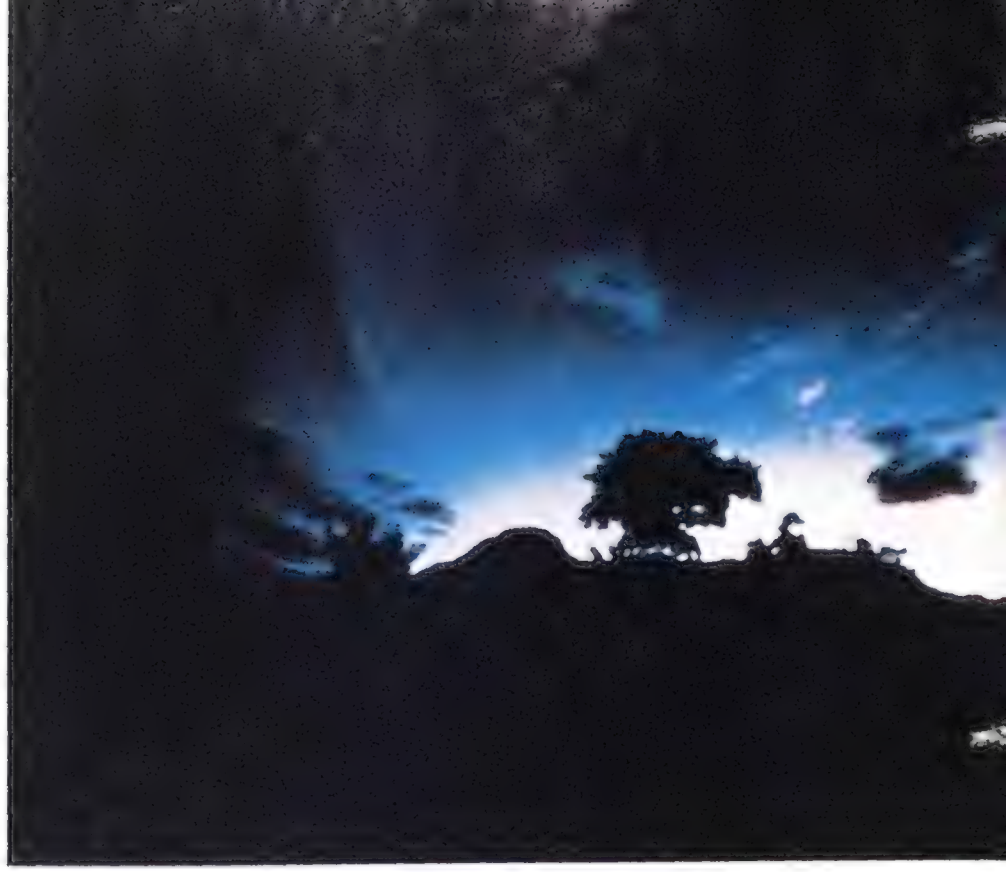
Chinese scientists had predicted that a great earthquake would occur in the Haicheng neighborhood on that day. At 7:36 P.M. it came—a long, shuddery heave of the ground. When it was over, nine out of ten buildings were severely damaged or destroyed, but perhaps 100,000 lives in and around the city had been spared. (Reportedly the Chinese had additional successes the following year, but details are scanty.) In 1978 the Soviets were able to predict a major earthquake in the Pamir Mountains just a few hours before it occurred.

As of mid-1983, these are the only significant earthquakes in history that Man has been able to predict with any degree of precision. The implications of such imperfect foresight are profound for millions of people who live along the Earth's zones of potential seismic activity, for the great temblors are among the most devastating of all nature's forces. The energy released by a major quake is stupendous; in the 1964 Good Friday earthquake in Alaska, it equaled 12,000 Hiroshima-type atom bombs. The explosive eruption



Reflector on one side of fault returns laser beam from other side; ground motion alters light's travel time.

Cleanup begins where freeway collapsed near Sylmar, California, during 1971 San Fernando earthquake.



Lights in the sky are sometimes observed before, during and after massive earthquakes, possibly caused

of Mt. St. Helens, in comparison, approximated the force of 500 such bombs. (Both are dwarfed by hurricanes, which release energy equivalent to half a million atom bombs a day while over the ocean.)

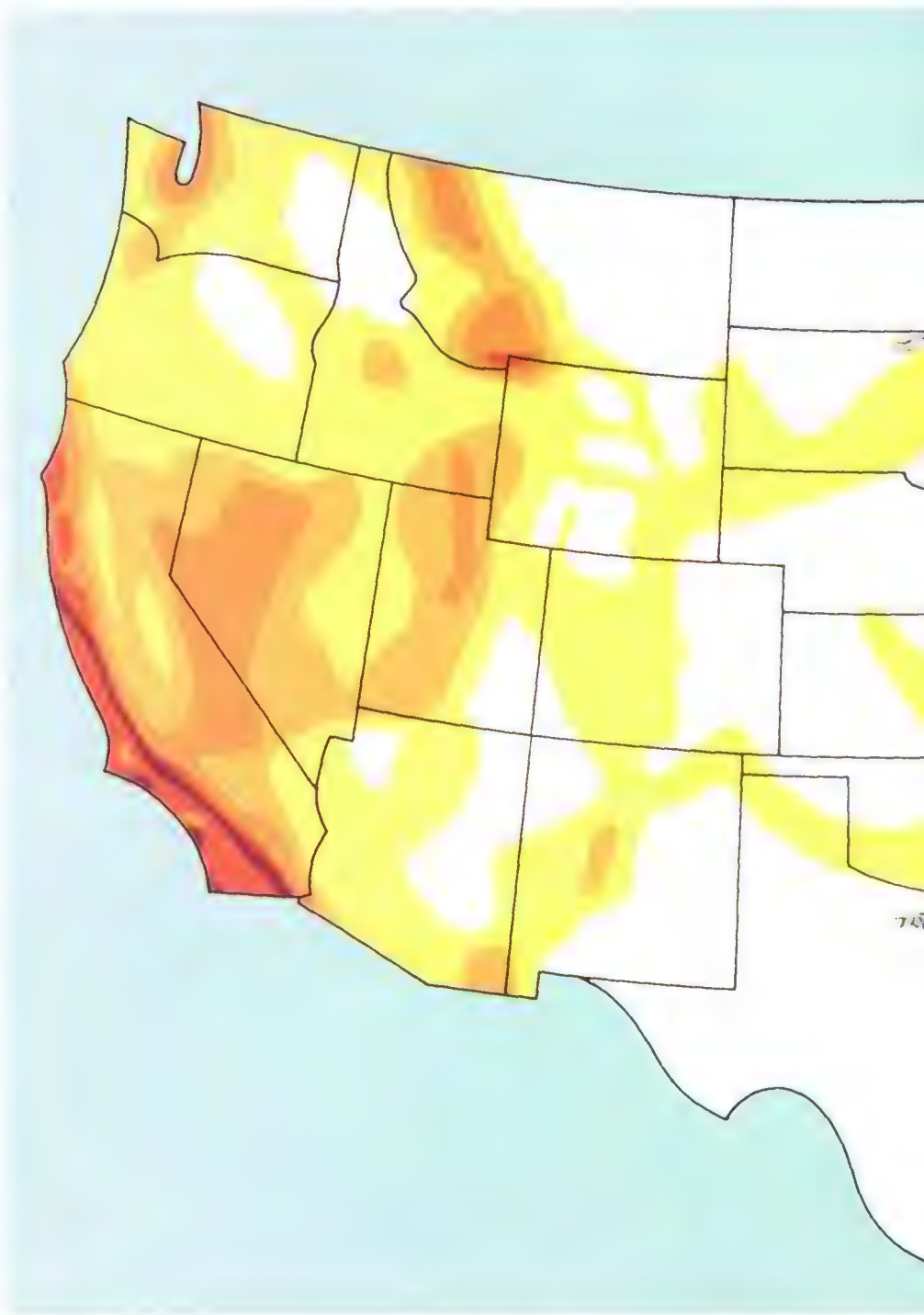
Around the world, earthquakes kill 10,000 to 15,000 people a year and inflict an average of $7 billion in damages. The number of deaths varies widely according to where the quakes happen, but in 1976 as many as 700,000 may have died, most in a single event in China that was not predicted.

Earthquakes have leveled cities, as happened to Lisbon in 1755, and killed as many as 800,000 people, as happened in Shensi Province in China in 1556. The most famous quake to hit this country may be the San Francisco earthquake of 1906, but the most far-reaching appears to be a series of three near New Madrid, Missouri, in 1811 and 1812, which changed the course of the Mississippi River and stopped clocks as far away as Boston.

California, of course, remains the most seismically active state in the nation. The state has experienced 12 large or major quakes since 1906; seismologists expect a major quake there in the next ten years. A 1980 government study foresaw 20,000 dead, $69 billion in property damage and all normal activity halted if a major earthquake were to occur near Los Angeles.

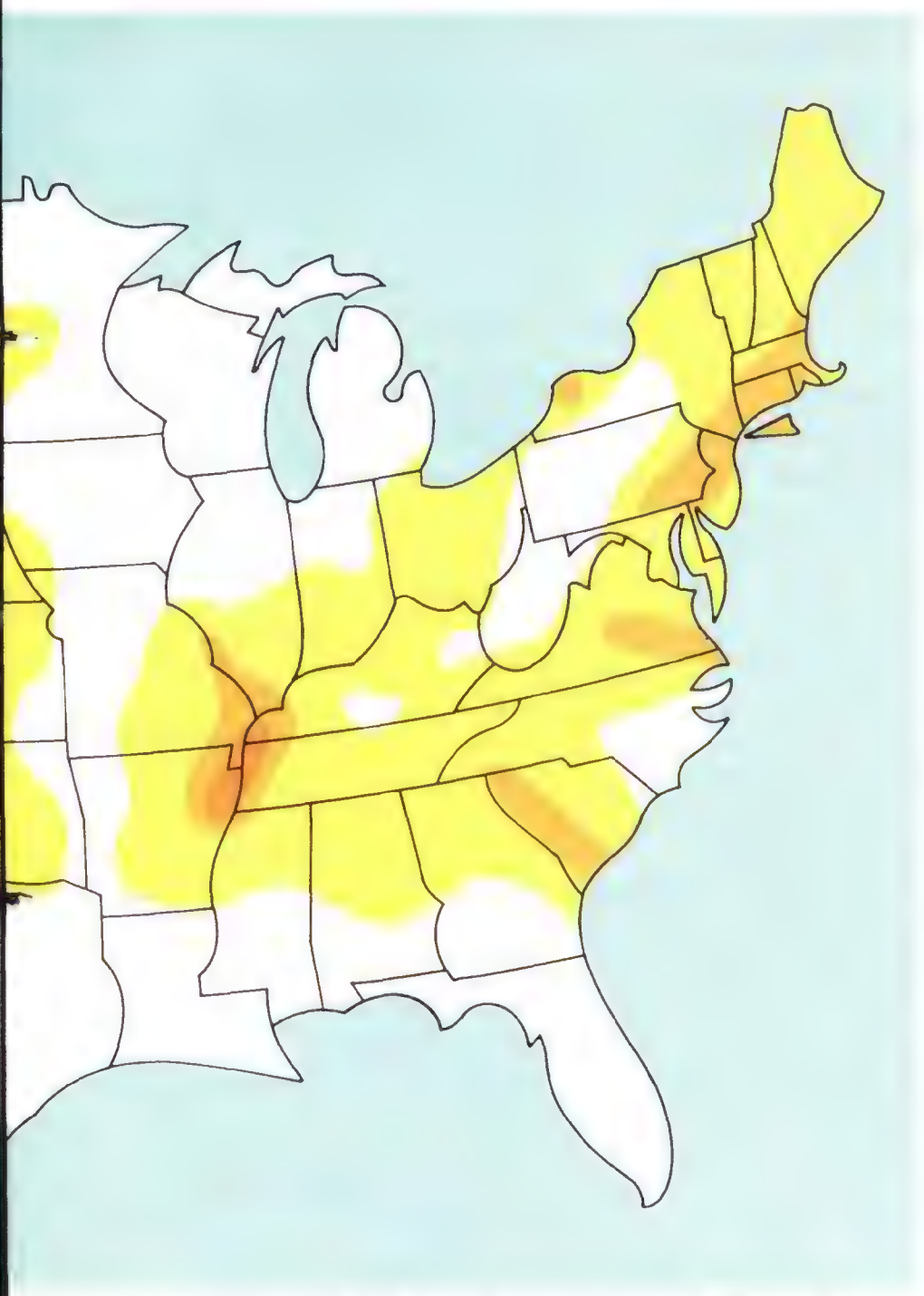
No part of the United States is totally immune from the danger. Boston was rattled just 17 days after the great Lisbon quake in 1755: walls and chimneys collapsed, stone fences fell apart, fish were killed in the harbor. In 1886 an earthquake shook Charleston, South Carolina, for more than eight minutes, killing about 60 people.

Today in the United States and throughout the world, researchers work to refine their still shaky art, in the hope that in the future earthquakes can be forecast with enough accuracy to save lives.



Contour map shows seismic risk; danger increases from yellow to red. Map is based on highest horizontal

by discharge of electricity generated by friction between the rocks. This picture was taken in Japan.



acceleration, the most damaging aspect of a quake, that can be expected in any area in the next 50 years.

The scientists face not only virtually impossible technical problems—they cannot afford to instrument all of the Earth's fault systems with creepmeters, tiltmeters and level lines—but knotty ethical issues as well, for the consequences of an erroneous prediction can be serious indeed. One bad prediction could cause unnecessary pandemonium—a series of them the same effect as the boy who cried "Wolf!"

The goal—accurate short-term prediction—is an elusive one, for the science of prediction is still in its infancy. As Professor T. V. McEvilly of the University of California, Berkeley, a member of the National Earthquake Prediction Evaluation Council, puts it, "Many scientists now realize that we are at square one, and that we *don't* know how to predict earthquakes." Learning will be expensive, but there is no other way, McEvilly says. "You can't make long-distance calls with tin cans and string."

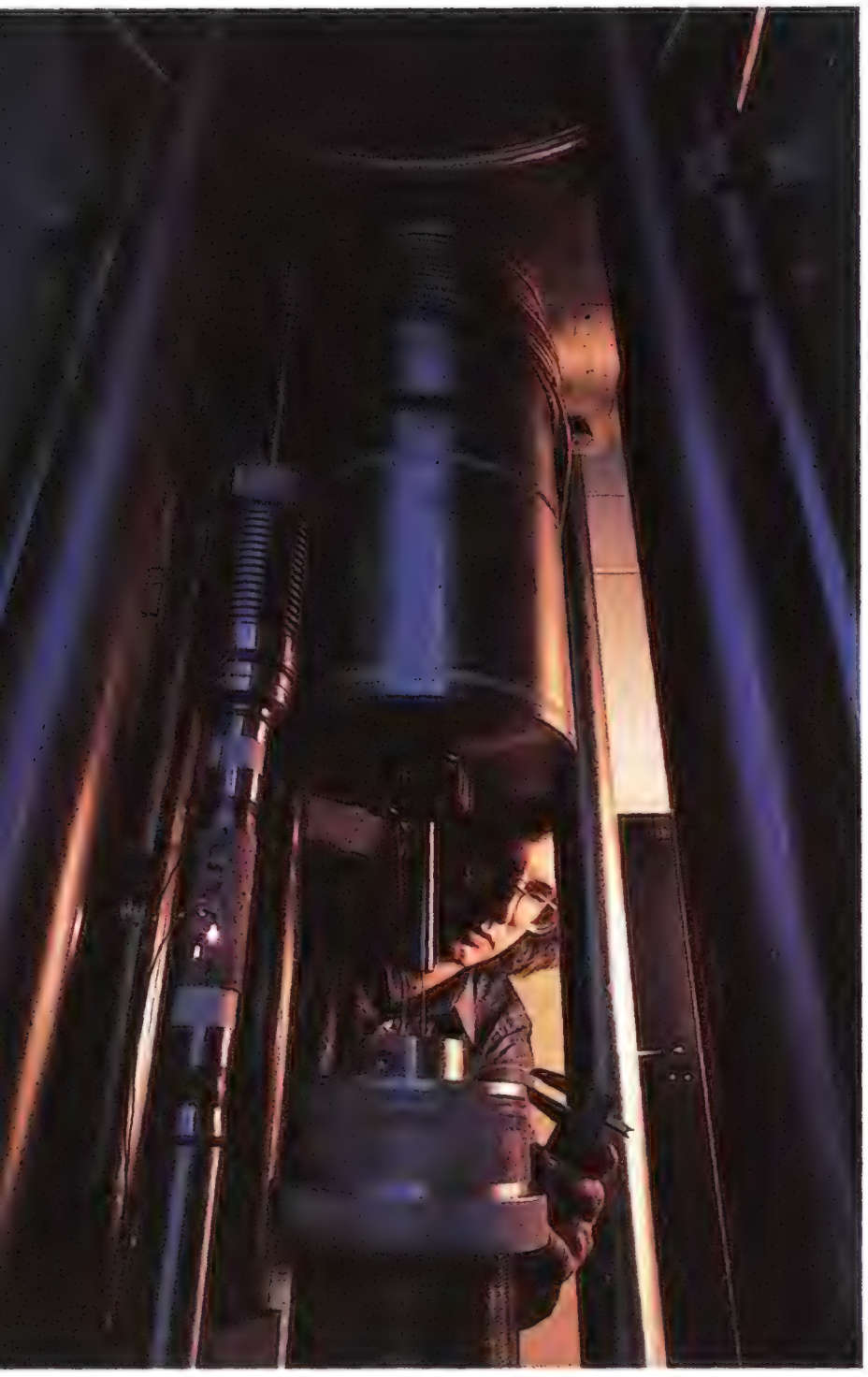
Yet progress has been and is being made, and the successes in China and Russia have added impetus to the effort. Here in the United States, the search is a main mission of the U.S. Geological Survey (USGS), which conducts and funds most of the nation's earthquake-prediction research. The National Science Foundation is another contributor. On the palisaded west bank of the Hudson River, scientists at Columbia University's Lamont-Doherty Geological Observatory huddle over their computers and before rock-squeezing presses. On the slopes around Denver, in the leafy heart of Menlo Park, California, and in other laboratories from Ithaca, New York, to Palo Alto, California, more scientists are pondering and searching. In the field, scientists and engineers are speeding to the scene of a seismic event almost before the shaking has stopped. They are all seeking to learn when, where and how strongly the next great quake will strike. The best way to learn, ironically, is to watch one happen, and then search the record for a pattern of events that can provide a warning for the next quake.

When the Earth is strained too far

Just what *is* an earthquake? It is the shaking that occurs when a slowly accumulated strain in the Earth's crust is suddenly released, typically along preexisting fracture lines called faults.

Stress most often builds up in places where parts of the Earth's crust are moving past each other along faults. Scientists believe the crust is actually a number of gigantic plates that are driven by the movement of the underlying convecting mantle. In some places, as along California's San Andreas fault, one plate is slipping horizontally along the edge of another. In others, as along the coast of Peru, one plate is diving beneath another.

Life-or-death race to predict quakes



Christopher Scholz checks rock-deformation apparatus at the Lamont-Doherty Geological Observatory.

Earthquakes happen because as portions of the Earth's crust slide past each other, their edges can become pinned by friction. Rocks are elastic, and energy can be stored in them just as it is in a spring. As the two blocks move on opposite sides of a fault, the motion strains the rocks near the fault. When the stress exceeds the strength of the frictional lock, the bond fails and the rocks rebound to an equilibrium position, slipping rapidly along the fault.

In areas where one plate is sliding by another, in the way that the Pacific plate is sliding by the North American plate along the San Andreas fault system, only about two-thirds of the adjustment is made by slippage along the fault system itself. The remaining third of the strain is distributed throughout the western United States, causing earthquakes and faulting in eastern California and adjacent mountain states. The earthquake that destroyed the four-block business section in Coalinga, California, last May 2, for example, was centered about 20 miles east of the San Andreas.

More difficult to explain are "intraplate" earthquakes, such as those that devastated the central Mississippi Valley between St. Louis and Memphis in 1811 and 1812. It is history more than scientific understanding that persuades us to assign a high earthquake risk to that area.

Deaths result from secondary effects

Earthquakes kill indirectly. A person would be quite safe in an open field, for example, during even a great earthquake. Fissures rarely open up on the surface. People are killed and injured by buildings collapsing on them, or by flying glass, falling objects, flooding from broken dams, fire or explosions from broken gas and electric lines, landslides, or tsunamis, the deadly ocean waves sometimes produced by earthquakes. (Such waves killed most of the dozens of people who died in the quake that struck northern Japan in late May. That earthquake, the strongest to hit Japan in 15 years, was centered about 100 miles offshore in the Sea of Japan.)

To be able to talk about earthquakes, scientists, disaster-agency planners and the rest of us need ways to measure and compare them. Most familiar is the Richter magnitude scale, which measures the height of earthquake-generated waves recorded on seismographs. Actual readings are adjusted for distance from the quake and its depth in the ground. The scale is logarithmic: a quake of magnitude 7 produces waves ten times larger than one of magnitude 6. The difference in energy is still greater: a quake of magnitude 7 releases roughly 30 times as much energy as a 6.

The San Francisco earthquake of 1906 measured 8.3; the 1964 Good Friday quake in Alaska measured

Charles F. Richter of Caltech, who devised the first magnitude scale for earthquakes, scans seismograms.

8.4. By comparison, the quake that struck Coalinga early last May was 6.5 (San Francisco's was 900 times more powerful).

More easily understandable is the Modified Mercalli Intensity Scale, which measures earthquakes by what actually happens on the ground. The more shaking and the more damage, the higher the intensity. At Intensity II, the quake is felt by only a few people at rest, especially on the upper floors of buildings. By Intensity VI, some heavy furniture moves and a little plaster falls. At Intensity XII, damage is total. Waves can be seen moving through the ground, and objects are thrown into the air.

Obviously, the rating on the Mercalli scale depends on how close the observer is to the epicenter (a point on the ground directly over the earthquake's focus) as well as the power of the quake itself. The magnitude scale is more objective, but a lot can happen to seismic waves between the place where the rocks break and the seismograph. Scientists are turning more and more to a third approach, the "seismic moment," which more accurately measures great earthquakes. This is the product of the area of the rupture, the average displacement along the fault, and the strength of the rocks that split.

Contributing Editor Richard L. Williams has written for SMITHSONIAN *on the Supreme Court, the Library of Congress and U.S. city renewal.*

As for earthquake damage, the number that really counts is horizontal acceleration—how much and how fast the ground will shake from side to side when a quake does come. The map on pages 42-43 gives the most recent estimates of the Geological Survey. It considers not only the likelihood of earthquakes themselves but how much shaking would result over how wide an area; depending on the characteristics of the rock involved, earthquakes of the same magnitude can produce very different results. The New Madrid earthquake, for example, caused severe damage over an area many times larger than did the San Francisco quake.

Most earthquake-prediction researchers here and abroad are young, and so is their science. The field is still less than 25 years old and dates roughly from the adoption of the plate-tectonics theory (SMITHSONIAN, January-February 1975).

Plate tectonics has given science a handle on long-term prediction. Investigators know that earthquakes are bound to happen where the plates collide. They know that the west coast of South America is threatened by the Nazca plate diving beneath it, and that Japan is more than due for more than one great quake. And they know that the southern portion of California's long San Andreas fault is an area where no major earthquake has happened since 1857, and where a great one is coming, inevitably.

What they don't know—and are determined to find

Lynn Sykes inspects earthquake-recording devices at Lamont-Doherty. He is optimistic about prediction.

Rod inside ancient Chinese seismograph caused dragon to drop ball in toad's mouth when tremor hit.

Uneven rock surfaces under extremely high pressure are studied in this apparatus at Lamont-Doherty.

out—is where a great quake will happen first, and when—with an exactitude fitting in with their generalized, long-term "by the end of the century" forecasts. What they would like to be able to formulate, in short, is imminent prediction as reliable and routine as weather forecasting.

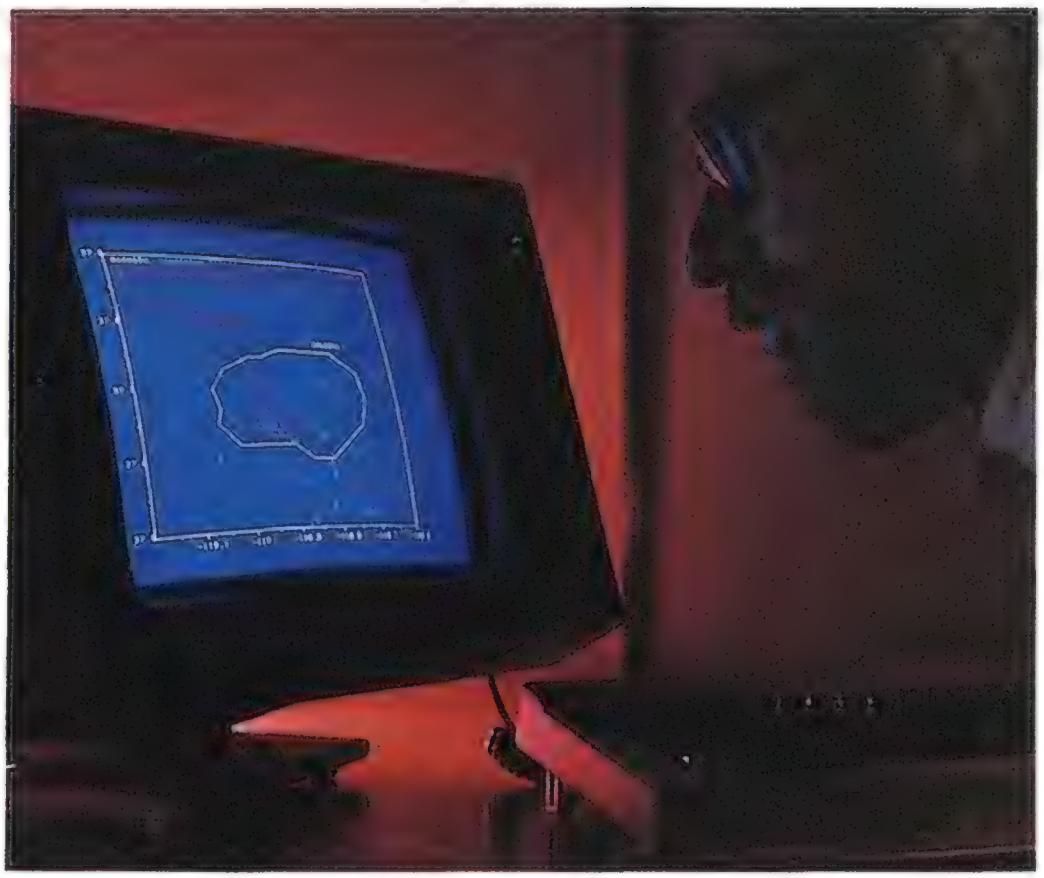
They need to know more about ground shaking: how it depends on the type of fault and length of rupture. When they know that, they will be able to estimate how much shaking will occur at a given point. That is why some scientists are concentrating on interpreting seismograms of strong motions recorded by instruments near the source of an earthquake. These waves and assessment of the intensity of shaking and damage during an actual earthquake will help in determining architectural standards designed to endure such intensities.

To help narrow their predictions from decades to days, geophysicists are using everything from the most venerable techniques of 75 years ago to the very latest and highest technology. They are trying to find still better ways to measure how much elastic strain has accumulated in the rocks on either side of a fault, and they are examining every possible clue to see which are precursors to major quakes.

Wires and quartz rods are laid directly across faults for precise measurements of how one side is creeping relative to the other. Geodetic measurements of how much a base line across a fault is lengthening or shortening are made with laser reflectors and satellite reflectors; researchers even use pairs of radio telescopes that measure the differences in arrival time of a light wave from a quasar billions of light-years away.

The most obvious precursors to a major quake are a series of foreshocks, but not all great quakes have them. So geophysicists are turning elsewhere:

- Tiltmeters, some as simple as cylinders of water connected by a horizontal tube, reveal any changes in the slope of the land—and possible tectonic activity.
- Gravimeters are able to measure minute changes in elevation because the force of gravity at the Earth's surface depends on its distance from the center of the Earth.
- Electronic instruments measure changes in the local magnetic field and in the electrical conductivity of the rock. Geophysicists believe that when rocks are stressed to about half of their breaking point they begin to expand, filling with numerous small cracks. The cracks fill with water, which changes the rocks' electrical and magnetic properties.
- Radon-gas measurements in well water are one way to detect such expansion. The idea is that the cracking



At Menlo Park, Stan Silverman watches video display of earthquake activity in the Mammoth Lakes area.

Technician Sandy Schulz removes a roll of recordings from strainmeter on a fault in Hayward, California.

exposes large areas of new rock surface to the underground water, which dissolves larger quantities of the radioactive gas.

The scientists are also looking at some things that, until recently, were generally dismissed as folklore. On occasion eerie lights have been reported in the sky just before or during a tremor (pp. 42-43). The lights may result from electrical charges in the atmosphere generated by friction of rocks moving along a fault line.

Folk wisdom in China has held that "earthquake sounds" immediately precede an earth shock. According to Charles F. Richter, developer of the first magnitude scale (SMITHSONIAN, February 1971), the sounds are most often compared to those of "thunder, gunfire or heavy traffic at a distance. It is produced directly by the transfer of elastic wave energy from the ground to the air."

While the scientists are using their instruments to create a contemporary record, they are also striving to maintain and extend the historical record. Knowing when earthquakes have occurred over long periods of time affords them a pattern from which they can make assumptions of a reasonable "repeat time" between one earthquake and the next. It helps long-term prediction no end to know where and when earthquakes have occurred in, say, Peru, where the record dates back to the early Spanish missionaries, or in Japan, which boasts a 400-year chronology of earthquake activity. The Chinese have observations dating back for more than 2,000 years.

Indeed, China has become a focal point for seismological interest. The Chinese are by no means unerring; they did not predict the 1976 Tangshan quake in which as many as 650,000 may have been killed. Nevertheless, with an army of 10,000 scientists and a network of 100,000 amateur observers, the Chinese are going all out on earthquake research. The professionals monitor sophisticated instruments, while amateurs report on such things as peculiar animal behavior. Shortly before earthquakes, horses, cows and pigs reportedly stampede for no apparent reason. Chickens and geese fly around dazedly. Dogs bark, seemingly at nothing. Snakes slither out of their holes in winter and freeze. The folk wisdom is that such strange, anomalous behavior is a sign that an earthquake is coming, but nobody knows for sure whether it really is.

Scientists in Beijing are trying to learn more about animal restlessness as a possible quake predictor; the USGS has spent $600,000 since 1976 on similar studies. One of them involved a thousand or more Southern California amateur observers who called in plenty of reports, but none that turned out to precede a quake.

California map shows San Andreas and some other faults. Inserts show slippage that occurs in a quake.

Another area of research has gathered impetus from the successful Chinese prediction at Haicheng—the plotting of sequences of seismic activity. A series of small earthquakes had followed an arc from the southwest toward the northeast. Apparently some kind of deformation front, perhaps in the Earth's mantle, had triggered each event in turn. The front was moving slowly, about 70 miles per year. The Chinese seismologists drew a line through the epicenters. When they extended it, they saw that the line headed directly toward Haicheng, and they were able to issue their warning in time.

Time and activity patterns, the precise pinpointing of quake-prone areas, and the factors that precede and follow quake occurrences are all part of the prediction effort—measurements that must be taken over and over, calculations that must be checked and rechecked. It is tedious and time consuming. But prediction, most geologists think, will inevitably become precise by this careful honing—not by a spectacular breakthrough or a new formula to foretell an earthquake. This is why scientists are protective of their budgets and projects; they are afraid that the pool of information and ideas, so carefully built over the years, will be threatened by an information gap if those budgets and research projects are not maintained in a continuum of steady, thorough exploration.

Japan spends four times as much as we do

It is of little comfort to reflect that the Japanese program for earthquake prediction has four times as much money to spend as that provided for comparable research in the United States. In China, 10,000 full-time workers were involved in earthquake studies in 1975; in the United States there are perhaps 1,000 full- and part-time investigators. The Earthquake Hazards Reduction Act of 1977 did establish U.S. budget priorities—some of which were ignored or eliminated during the recent recession. Scientists are worried about the present reduction in research funding and what this presages for the recruitment of new scientists ready to use their talents to pursue quake prediction.

Most now at work think they can do it. Discussing his colleagues who are dubious about the prospects for prediction, Lynn Sykes of Lamont-Doherty says, "I think they are far too pessimistic. If you look at California or Alaska—compared with 1968 when we had almost no idea of which were good places to look for the next big earthquake—I think we can pick six sites in California that we know long-term, say, over the next decade or two, have quite a high probability of being the sites of good-sized earthquakes. [According to Sykes, these places are: Parkfield in central California, two sites along the San Andreas fault northeast

of Los Angeles, Anza and San Bernardino along the San Jacinto fault, and San Juan Bautista.] We will not have all the sites of the large earthquakes in California for the next ten or 20 years, but we are at least picking a lot of the right areas for good reasons."

The same thing is true, Sykes says, in southern Alaska, where scientists have picked two seismic gaps (places where earthquakes have not happened in a long time and therefore are to be expected): one of them in the Shumagin Islands, which are off the tip of the Alaska Peninsula, and the second at the head of the Gulf of Alaska.

We already know how to reduce damage

Even predictions within ten or 12 years—still called long-term—can be helpful in deciding whether to locate a nuclear power plant in an area or what kinds of building codes should be required in high-risk areas. Bruce A. Bolt, professor of seismology at the University of California, Berkeley, feels that in the United States the ability to forecast how much the ground will move at a specific location is more important in reducing earthquake losses than prediction of the actual occurrence of the earthquake itself. "Earthquakes remain great killers and inflict heavy economic loss," Bolt says, "yet much is known about earthquakes and how to reduce damage."

Improved zoning is the first and most fundamental step in reducing earthquake damage. The better we get at delineating areas of seismic risk, the better we can decide where to build—not only homes, but schools, hospitals, dams, bridges, high-rise buildings and power plants. Some older buildings can be made more earthquake resistant: houses can be improved, for example, by anchoring the sill to the foundation, adding bracing to supports for floor joists and the load-bearing walls of garages, and strapping the chimney to the house. New buildings can incorporate the latest technology, including shear walls that bend into parallelograms rather than crack when subjected to horizontal force. Gas-, electricity- and water-distribution systems can be made less susceptible to disruption.

Even knowing that an area will be quake-free for a considerable length of time because it is early in its seismic-gap time period can be an incentive for investment in buildings that need only that much longevity to realize a profit. It may make economic sense to build at a place that has just *had* an earthquake.

The scientists have learned that they cannot be too careful about what they predict, and that they must be aware of the public reaction to their predictions. They are acutely conscious of the consequences of a spectacularly wrong guess made by two young American scientists in 1979. At a meeting in Argentina, Brian

The giant scar of the San Andreas fault runs across surface of Carrizo Plain in central California.

Life-or-death race to predict quakes

Brady of the Bureau of Mines and William Spence of the USGS, both assigned to Denver, forecast three earthquakes off the coast of Peru—the first and smallest about June 28, 1981, with larger ones to follow on August 10 and September 16. The predictions had evolved from Brady's work with rock fracturing in mines, work he extrapolated to the much larger fault systems of Peru.

The earthquakes did not occur and still have not, but the predictions caused an uproar in Peru. There was some panic buying of foodstuffs and survival supplies, and some residents of Lima left the city around the June date. Members of the U.S. National Earthquake Prediction Evaluation Council, which had rejected the prediction, declared that they would be perfectly relaxed about being on the Peruvian seacoast on the all-too-precisely predicted days. The Lima newspapers challenged the predictions, and John Filson, chief of the office of earthquake studies for the USGS in Reston, Virginia, went to Lima to reassure press and public.

Spence issued an elaborate disavowal before the June date, and Brady withdrew his prediction on July 20. He still believes that any time now, great quakes will wreak havoc along as much as 1,500 miles of the coastline of Peru.

Like all seismologists, Clarence R. Allen of Caltech, who is also director of the evaluation council, is concerned about the scientists' dilemma. As Allen recently wrote: "One has the uneasy feeling that the Peruvian-prediction episode may not be completely over. Seismologists have pointed out for a number of years that, on the basis of the generally accepted, seismic-gap concept, parts of coastal Peru and northern Chile represent perhaps the most likely locality anywhere in the world for a truly great earthquake, such as last occurred there in 1868."

The fear is that somebody, by chance and for the wrong reasons, will predict an earthquake that will in fact occur on the predicted date. Seismologists will then have the problem of persuading the public that the *apparently* successful prediction method has no basis in reality.

A more difficult question concerns predictions seismologists feel more sure of: how much should scientists tell the public—and when? C. Barry Raleigh, director of Lamont-Doherty, says: "Our ability to interpret the observations [of fault zones] and relate them to premonitory events of a great earthquake is improving. Indeed, our progress makes it almost inevitable that a large earthquake will be predicted for one of the major metropolitan areas of China, Japan or the United States within the next 20 years.

"What then? How will people respond, and what effects will the prediction have on the social and economic fabric of the affected area? We are not very knowledgeable about the answers to such questions. We are still in the dark as to the best way to arrive at and issue a public prediction."

Robert Wallace of the USGS thinks people will ignore earthquake predictions until they are forecast with a probability of 50 percent or more.

Any predictions made today would go first to the National Earthquake Prediction Evaluation Council, a standing committee of government and academic scientists that advises the director of the Geological Survey. If there were a consensus that the prediction was valid, the director would announce it and alert the governors of the affected states. In practice, state and local officials would be kept informed all along of the progress of the prediction evaluation. California has its own prediction-evaluation council; the federal and state bodies coordinate their efforts.

A mature seismic gap exists in Southern California today, but no one is ready to order the evacuation of Los Angeles. Seismologists can say the probability of an earthquake with a magnitude greater than 7 has risen to about 13 percent in California as of now, but they can come no closer. They may not be able to come closer until the next great quake does occur, and they can go back through the detailed records they have so carefully amassed to see if they can pull out genuine precursors. As Robert Wallace put it: "You can chase just so many jackrabbits at a single time and there are always jackrabbits out there, always signals to be chased, and you have to find out what is meaningful or not meaningful—but that's just the way science is."

Peruvian woman grieves after 1970 quake, and rock slides it triggered, killed an estimated 66,000 people.

Bizarre bedroom in Il Vittoriale, used by d'Annunzio only one night a month, includes an arrowless statue of

By Meryle Secrest

D'Annunzio's life, like his house, had many mansions

A sparrow-sized king of hearts and letters, Italy's poet-hero won fame besieging actresses and capturing the city of Fiume

St. Sebastian and (over bed) a painting of the poet as a leper being kissed by St. Francis of Assisi.

To do justice to the memory of that neglected Italian poet, novelist, orator and war hero Gabriele d'Annunzio, is to tremble on the verge of hyperbole. D'Annunzio died on the eve of World War II, and he was, depending on one's point of view, one of Italy's immortal poets or the author of some of the worst novels and plays ever written.

Caricatures of d'Annunzio as an incorrigible dandy, effete and decadent, were common before World War

A noted novelist at 26, d'Annunzio poses with book and boutonnière as one of his own Romantic heroes.

I, a struggle in which he became known all over Europe for legendary courage in battle. He was the tenderest of men, but one of the most cynical. He was tiny, just over five feet three inches in his stocking feet, and not very handsome. Yet he proved irresistible to women, whom he invariably loved and abandoned. He was grandiose, profligate, brilliant, deluded, a slave to ostentation and, in his time, admired with passionate unreason.

Nothing illustrates the paradoxical nature of this "penniless provincial character of genius," as Italian writer Luigi Barzini once called him, better than the 18th-century house in northern Italy which, during the final years of his life, he transformed into a bizarre showplace. The house is now a state-run museum surrounded by gardens. Its name, Il Vittoriale degli Italiani, translates as The Victory Monument of the Italians, but no one should be fooled. Il Vittoriale is a monument to its creator.

The main entrance is on a hill above the town of Gardone Riviera on Lake Garda, a Mediterranean oasis ringed by distant, snow-capped Alps. You go in through an arched gateway and up a drive, gardens spreading on either side as far as the eye can see. When World War I broke out, the original rustic villa here was still owned by a German art historian, a friend of Wagner's, who planted its 25 acres with olive groves, cypresses and oleanders. Confiscated by Italy as a spoil of war, it was bought by d'Annunzio in 1921. The new owner not only renamed it, but redid it, passionately uprooting cypresses and olives in favor of pillars, walls, arches, flights of steps, paths that wind upwards to piazzas, fountains and monuments. Over every arch is a cryptic motto. Every flagpole commemorates a victory, each urn an action, each stone a memory.

Color photographs by Lee Battaglia

Caricatured as glory hound in 1903, he holds ship, laurel wreath.

Famous conquest, Eleonora Duse, played roles he wrote for her.

Satirized as dandy and lover, he delicately sniffs a lily.

Entering it, a visitor steps upon a stage created by a Pirandellian genius who was his own landscape gardener, playwright, director and leading man. Today the beckoning flights of steps are barricaded and overgrown with weeds. The stucco is cracked, the pillars chipped and the alcoves, empty of their statues, stare like blank windows from the past. The flagpoles are bare. The mist, stealthily encroaching, rises off the lake. The curtain has gone down on the last act and the audience has left, but the plot remains a riddle. Was d'Annunzio, as his detractors claim, merely an inspired poseur whose attempts to memorialize his own achievements are merely monuments to grotesque self-delusion? Or is he one of the remarkable figures of our time, overdue for a reassessment?

He was born in the Abruzzi in 1863, the first son of a sometime mayor of Pescara and a modest, retiring mother of impeccable lineage. Gabriele, the heir apparent, was given an inordinate amount of admiring attention by his father, Francesco, and even more, submissive adoration from his two older sisters and his mother, who appears to have transferred to him the frustrated emotions of an unhappy marriage. Standard biography presents the father as a self-indulgent and boastful upstart—he had been adopted by a well-to-do shipowner—whose infidelities were the scandal of Pescara. A self-abnegating mother, a libertine father—the outlines of sacred versus profane love, and of victimized (female) suffering versus cynical (male) exploitation, are almost too starkly drawn for comfort.

Gabriele was spoiled. He was angelically beautiful. He was precociously determined to be famous. Almost his first memories were the tales told by his grandmother about Garibaldi and the Thousand. Young d'Annunzio burned with a mission to unify and inspire Italy, to direct the dreams of his countrymen backward to their Roman past and forward to a glorious future as a nation united. The redemptive nature of heroic deeds and of honor reclaimed are recurring themes in his life.

The boy was also spectacularly gifted. By the age of 16 he had published *Primo vere* (*First Truths*), poems truly remarkable both for their overwrought lyricism and their unabashed sensuality: ". . . With trembling agitation I laid you on the water lilies and kissed you with convulsed lips, crying: 'You are mine! . . .' And beneath my embraces, like a viper, you writhed and groaned. . . ."

That a mere adolescent should publish such erotic verses was guaranteed to cause a sensation, and d'Annunzio took instinctive advantage of the resulting publicity. After secondary school he went to Rome, intending to enter the university, but almost immediately turned to journalism. In 1882 he published his

Biographer and critic Meryle Secrest is the author of a book about the late American art expert Bernard Berenson. She lives in Walpole, New Hampshire.

second volume of verse, *Canto novo* (*New Song*), which ran to six editions, and sold 10,000 copies in less than three years. D'Annunzio then tried his hand at novels. Sometimes writing all night, he dashed off *Il piacere* in 1889 and in 1891 *L'innocente*. There were more, among them *The Triumph of Death, The Virgins of the Rocks* and, in 1900, *Il fuoco* (*The Flame of Life*).

Deflowered virgins, insulted honor, flaming destiny, Satanic revenge—his plots were absurdly melodramatic. His cloying Symbolist literary style was partly derived from Oscar Wilde and the plummy preciosity of Walter Pater. Along with the emphasis on sensuality, d'Annunzio showed affection for the folktales of the Abruzzi, his native province, and its almost Sicilian sense of tragedy. An inordinate number of his stories involve doomed love affairs, with such Abruzzian flourishes as joint suicide leaps off rocky promontories. Superstition, violence, sadism and sex: it was a highly salable formula. This was a florid time, of course, and in it d'Annunzio became that rarity, a best-selling author admired by the intelligentsia. Henry James, for instance, was impressed by his inventive language. Arthur Symons wrote that he was "beyond all rivalry the most adored poet, in any country, of our time."

Beautiful greyhounds and fine horses

Even among those conquering Italian males who specialize in love, this small man's performance was spectacular. By the age of 20, over the determined opposition of her parents, he had courted and won Maria di Gallese, the exquisite daughter of a duke. She was rich, a distinct advantage to a journalist husband who, though successful, could not quite support himself in the style to which he hoped to become accustomed. But her outraged father cut her off without a cent. D'Annunzio was a good sport about it. He loved her, after all, and wrote even faster, becoming a reviewer and a social columnist, using such pseudonyms as Duca Minimo and Sir Charles Vere de Vere.

He kept beautiful greyhounds and fine horses. He rode to hounds. Until he bought Il Vittoriale he always rented houses, and to move was, for d'Annunzio, a signal for complete redecoration and refurnishing with ducal indifference to the cost. Recklessly, he piled debt upon debt until the patience of his creditors was exhausted. When that happened he would take flight, abandoning his rich furnishings, and begin again somewhere else, sometimes even in a new country. Customarily he retired at midnight, not to sleep but to work until three or four in the morning. Then he slept till noon.

D'Annunzio was a man who regarded himself as God's gift to women and he gave of himself profusely. In 1887, after a decent marital interval during which

1909 flight with Glenn Curtiss (left) stirred lifelong interest in "physical rapture" of flying.

A day at the races in Florence finds debonair poet happily ignoring ponies to pose with admirers.

War hero d'Annunzio (right) sits with comrades from torpedo boat raid that won him a sixth medal.

Study in Il Vittoriale includes books, Parthenon friezes (far wall), statue of the Victory of Samothrace.

On the desk is a head of Duse which d'Annunzio covered with a veil when writing, to avoid distraction.

he sired three sons, at age 24 he began to pursue the ladies with a zeal that suggested his father's, or that of Don Giovanni himself. He favored countesses, duchesses, famous actresses. They were all gloriously beautiful, sometimes unhinged and invariably taller than their little conqueror.

Why they succumbed is something of a mystery. Although well-proportioned and radiating energy, d'Annunzio outgrew his cherubic good looks fairly early. A French actress once commented in unprepossessing detail: "His scanty hair, of washed-out color; the protruding eyes, without eyelashes or eyebrows, had the bluish-green of soapy water. The pallid lips revealed funny little crenelated, unhealthy teeth. While his thick skin covered unequally a face which ended in a Valois beard. . . . How can one explain his conquests except by his extraordinary verbal power, and the musical timbre of his voice, put to the service of exceptional eloquence?"

For d'Annunzio, any woman who would run was worth chasing. He would bombard her with flowers, verses, telegrams, perfumes, sometimes including highly suggestive statuary. In the pursuit of some temporarily desirable woman, he would promise anything, to immortalize her with a book, even in really extreme cases, to marry her. (Although separated from the long-suffering Maria, he was never divorced.)

Astonishing numbers of women took up residence as the temporary *maîtresse en titre*, and hung on desperately after all passion had fled. D'Annunzio endured their recriminations stoically, in the manner of one persecuted beyond endurance. But then, to win invariably made him melancholic. Returning from one successful campaign, he wrote, "My mouth biting the white flesh of your shoulder thought it was chewing a bitter laurel leaf." An affair was, as it were, programmed to self-destruct.

One of the longest lasting, certainly the most celebrated, of his liaisons was the one with Eleonora Duse who, when they became lovers in 1895, was at the

Master bathroom, just as the master left it, is fantasia of toiletries and objets d'art, including Persian tiles and Michelangelo prints. Pièce de résistance is tub glazed in a deep royal blue.

height of her acting fame. Correctly discerning in her an ideal heroine, d'Annunzio began to write dramas for her.

As might be expected, d'Annunzio's monologues were interminable, his plots lurid and the inspiration relentlessly autobiographical. In *La Gioconda*, for instance, which became one of the Duse's great successes, a sculptor finds himself torn between love for his model, Gioconda, and his wife. Silvia, the wife (a heroically suffering victim), is bound to be sacrificed. Duse, as Silvia, embodies pathos and nobility. Her hands are smashed as she tries to save Lucio's statue of Gioconda from falling, even though her rival has already replaced her in her husband's heart and bed.

Most of d'Annunzio's success as a playwright was due to Eleonora. Her unique gifts, especially the ability to make melodramas plausible by the convincing power of her own personality, temporarily blinded audiences to the severe shortcomings of the playwright's static plots and turgid monologues. When she ceased to breathe life into his dramas, d'Annunzio's fame as a playwright was effectively over.

As a writer d'Annunzio had the curious habit of publishing the end of his private affairs in advance. His novel *Il fuoco*, for instance, brought out in 1900, four years before the end of his relationship with Eleonora, tells the story of La Foscarina, an older woman in love with Stelio, a beautiful younger man (guess who?) destined to leave her. Although Duse reacted with great forebearance, refusing to stop publication of the novel or take offense, it is not hard to guess how she must have reacted personally to one incident in the book. The lovers have wandered into a labyrinthine garden. Stelio, in his element, teasingly appears and disappears, while Foscarina grows more and more frenzied. "She flung herself into the thicket to find him . . . . but turning followed turning, and every turn looked the same. . . ." The fictional episode exactly paralleled an incident that Duse described to a friend, in which she found herself trapped in a laby-

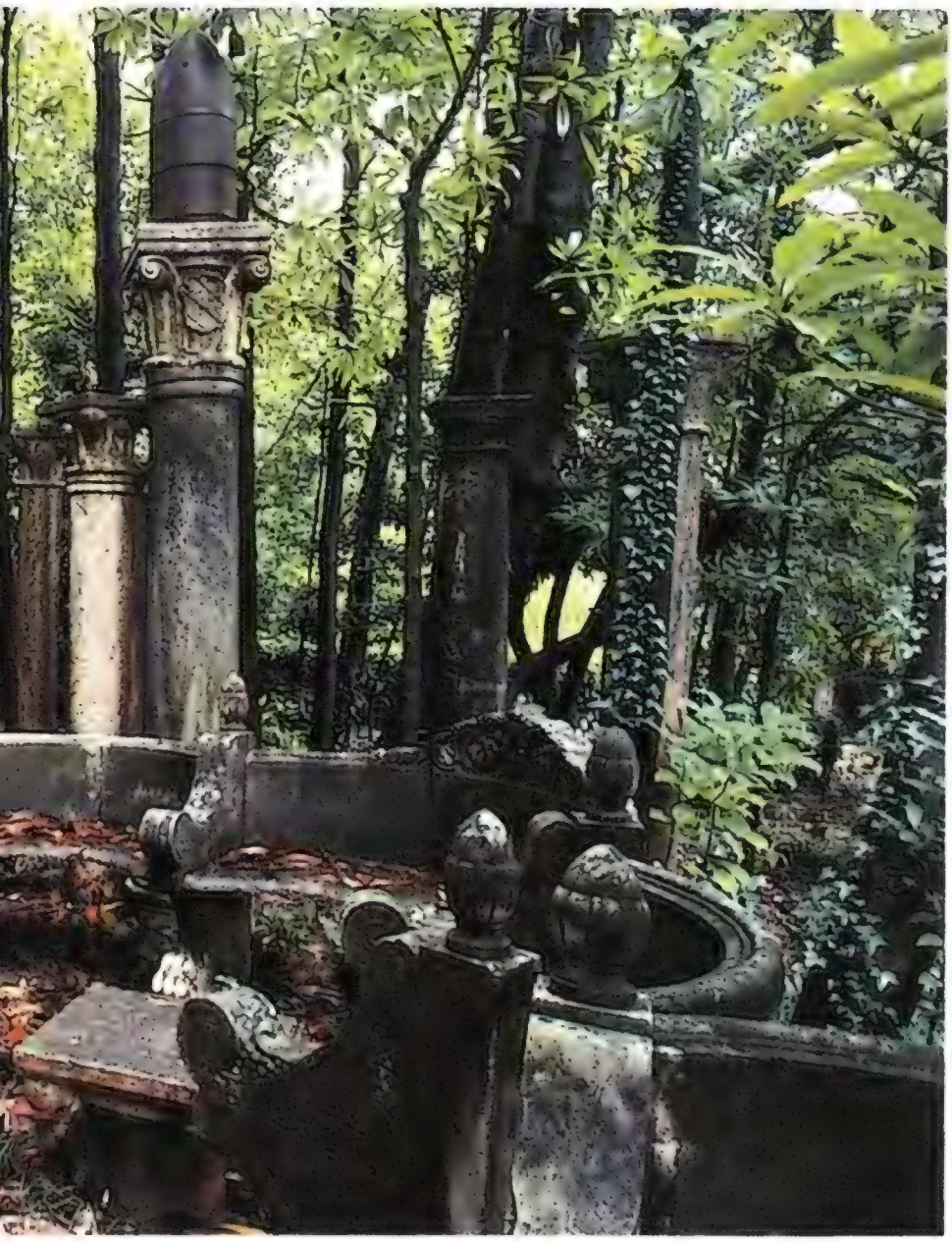
Prow of *Puglia*, memento of marine exploits, is now moored in the grassy sea of Il Vittoriale's gardens.

Crumbling stone benches backed by votive columns bellicosely tipped with World War I shell casings mark

rinth. "I had the horrible impression that I'd never succeed in finding the way out. And I kept crying in anguish: 'Enough! Enough! I cannot stand it any longer! D'Annunzio!' "

In his mid-40s, he turned to a different theme, *Italianità*—Italianism. In *La nave*, a historical drama first performed in 1908, he praised the past glories of Venice and offered an impassioned plea for Italian conquest, primarily in the Adriatic. When World War I broke out d'Annunzio hoped that his country would fight alongside France, taking arms at last against Italy's hated adversary, the Austrian Empire. His speech, made in Genoa in the spring of 1915 and repeated in Rome, stirred the nation, and encouraged Italy officially to join the war on the side of the Allies. His countrymen even coined a name for his exhortations: *d'Annunzianesimo*, a term that meant patriotism raised to the level of political ideology.

Once Italy was in the war, a lesser man, especially at 52, might have considered his work ended. For



center of garden d'Annunzio created as a memorial to the "twenty seven" Italian victories in the fighting.

Courtyard of The Priory, the poet's living quarters, includes a towering tree, bricks laid in patterns.

d'Annunzio, however, the supreme moment had arrived. He agitated so hard that the Italian High Command gave him a commission as a lieutenant and authorized him to put in stints in the navy, infantry and fledgling air force—but with the understanding that he would not be in combat. However, he wangled his way into the front lines and ended up actually fighting against the Austrians in the battles of Veliki and San Michele. In 1888 he had prophesied that supremacy at sea would be determined by torpedo boats, so he wanted to serve aboard one. By pulling further strings he managed to take part in a night torpedo raid on an enemy port.

In the air force he at first acted dutifully as an observer. By September 1916 he was dropping bombs over enemy naval bases and attacking the Austrian lines. His most famous flight, in an Ansaldo SVA-9, was a bombing run on Vienna, 300 miles away. Once there, instead of bombs he dropped leaflets, all of which, naturally, he had written himself. One chided the Austrians for having Prussian commanders. If d'Annunzio had ever been caricatured as a decadent popinjay, by the end of the war that image was swept away. His exploits had made him a heroic national figure, drowned in an avalanche of honor and acclaim.

D'Annunzio's finest hour, however, was yet to come. For Italy, the great treachery of the Treaty of Versailles was her allies' refusal to recognize her claim to the ancient port of Fiume, on the Dalmatian coast. For d'Annunzio, Fiume (now the Yugoslav city of Rijecka) became the symbol of everything he had fought to gain for Italy. Giving up Fiume would amount to betrayal of *cara Italia* by her own politicians. In 1919, in a daring move that may have inspired Mussolini to organize his march on Rome three years later, d'Annunzio collected a few hundred volunteers, marched on Fiume and captured it without a battle. (Its predominantly Italian citizens simply cheered his victorious entry.) He wrote a concise, somewhat socialist constitution for the city (though, among other things, it decreed that music should be a major study in all schools). Impeccably uniformed and monocled, he ruled over Fiume for 15 months.

This delighted the people. But it was acutely embarrassing to the Italian government, especially in 1920 after it had negotiated the Treaty of Rapallo, making Fiume a free state. A month after Italy had ratified the treaty, the government found it necessary to go to war in order to honor its obligation. Italian battleships lay at anchor, prepared to bombard a largely Italian civilian population. Italian troops were ready to fire on their countrymen. A shell, fired

by the battleship *Andrea Doria*, hit the palazzo d'Annunzio was using as headquarters, wrecking his study and wounding him in the head. Bitterly, he bowed to the inevitable and evacuated Fiume.

His point had been made. And for his part in the affair, the little poet-warrior was even awarded the title of Prince of Montenevoso (1924), a reference to the highest point in the Carso range some 17 miles north of Fiume.

Mussolini always praised the poet assiduously. Some say that d'Annunzio detested Mussolini, but he implored Il Duce to visit Il Vittoriale on several occasions and kept up a steady stream of advice (warning against Hitler, "the Charlie Chaplin of the Niebelungen," and disarmament) and in 1935 supported Italy's invasion of Ethiopia.

D'Annunzio died in 1938. Inevitably, his national reputation fell with the fall of Fascism. And since World War II his claims to immortality have deserted d'Annunzio's memory, one by one. As a poet he is seldom translated; as a novelist he is unread; as a playwright he is performed, if at all, only out of antique curiosity. Even in Italy, his heroic deeds are all but forgotten. The Vittoriale alone remains. After the poet's death the grounds and one building were turned into a museum administered as a national monument. For a time it achieved some renown as a summer arts center. Tourists came to see the outdoor amphitheater, the immense tomb where he and his faithful companions in the march on Fiume are buried, the plane in which he made his raid on Vienna, his private torpedo boat, MAS 96, which provided the initials from which d'Annunzio fashioned his personal motto, *Memento Audere Semper* (Always Remember to Dare).

But the clutter did not prove an adequate draw. It was clear that the museum must close or play its last card and open d'Annunzio's private residence, La Prioria, to the public. The decision to do so saved Il Vittoriale. Drawn by the curious sights of a house in which everything—down to pens and toothbrushes—was as he left it, more than a quarter of a million tourists a year began to beat a path to the little conqueror's door.

Italian philosopher Benedetto Croce once sagely noted that "D'Annunzio presents the spectacle of a man continually in search of his own personality." And collected in Il Vittoriale are all the fruits of that search, from fin de siècle opulence to the claustrophobic accumulation of images and the symbols multiplying themselves like so many reflecting mirrors. Bejeweled, naked torsos of languorous, vaguely Greek young men stand cheek by jowl with a bust of Buddha or a crucifix. The broken steering wheel from a motorboat serves as an altarpiece in the private chapel. The fairly explicit, gilded statue of Leda and the Swan has been pushed into a corner of the music room to keep it out of sight, one of the guides explains, adding "I don't know why. You can see worse on the television every day."

In the library, with its great globe and a death mask of Napoleon, d'Annunzio is a conqueror. In the music room, he is a genius rubbing shoulders with Wagner and Liszt. In the room of relics, an extraordinary collection of sacred objects, he is a religious devotee.

As he aged, the poet-superman fell prey to despondency. His last book, *Libro segreto*, a memoir published three years before his death, is a frank confession of loneliness, regret at the collapse of his marriage, and a conviction of life's pointlessness: "The whole of life is unchanging. Melancholy has but one face. The summit of all thought is folly. And love is inseparable from treachery."

That conclusion is common enough for a romantic individualist grown old. Like most of d'Annunzio's work, seen in perspective, it is not especially original or interesting. What makes him fascinating is not his works, but the life of dramatic posturing, sometimes heroic, sometimes ambiguous, that his relics preserve.

Yet, who can be sure of anything about him? For instance, in the reminiscences contained in *Libro segreto* he claimed he had tried to commit suicide in 1922, and he certainly fell out of a window, sustaining severe skull injuries. But whether d'Annunzio jumped or whether, as it was said at the time, he was pushed out by the angry sister of his last mistress, no one will ever know.

Rich red-and-gold dining room is dominated by figure of satyr demonstrating an appetite for fleeing nymph.

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JULY 1983
OCTOBER 19

By Richard J. Margolis

In rural America the post office remains a Mecca

The old post office at Liberty, Maine, is now a museum. It was reconstructed after almost a century's service.

Many of our small towns are struggling to keep an institution that delivers more than mail; it might be 'the only thing left to be proud of'

When the citizens of Fitler, Mississippi—a river hamlet north of Vicksburg and west of Onward—found out in May 1978 that their post office might be closed, they were neither surprised nor reconciled. Maybe to outsiders the tiny P.O. and the general store that provided it a niche didn't seem like much: just another roadside place squatting by a cotton patch. But to Fitler folks, both blacks and whites, it loomed large enough. For one thing, there was the flag out front, red-white-and-blue proof that in the eyes of the federal government Fitler still existed. "We already lost our school," an elderly Fitlerian remarked. "The post office is about the only thing we got left to be proud of."

For another, there was Loryce Hawn, the spunky "Post Lady" (opposite) who also presided over the general store. People had come to count on her caring ways and her daily ministrations. Since 1976, when "Miss Alma" retired as postmaster, Mrs. Hawn had been cheerfully dispensing aid and comfort to her neighbors—filling out their money orders, helping with their correspondence, addressing their envelopes, often extending them store credit against distant, uncertain paydays. (A sign by the cash register, however, suggested there were limits even to Mrs. Hawn's largess. It read: "Please no credit on Sunday—if I could afford credit on Sunday I could afford the day off.")

With the help of their Post Lady, residents got up a petition and dispatched it to the Postal Rate Commission in Washington. It bore 28 signatures, virtually the entire Fitler roster. If some of the handwriting looked identical, Mrs. Hawn explained in an accompanying note, that was because she had done the signing herself, "on behalf of the people and in their presence."

Fitler's written appeal merits our attention because it typifies the stubborn affection that rural Americans have always felt for their post offices. From the very beginning they welcomed and cherished this "enlarger of public life" that bound farm to city, and the remote West to the populous East. Emerson lauded the mails as "a fine metre of civilization," an instrument that shed light on a murky wilderness. Tocqueville wrote of the system's rapid expansion. "In Michigan forests," he marveled, "there is not a cabin so isolated, a valley so wild, that it does not receive letters and newspapers at least once a week; we saw it ourselves."

No rural settlement back then was so small or so raw that its residents did not feel entitled to postal service. And because many of the new maps of America were postal maps—drawn on the basis of contemporary mail routes and stations—it was literally true that no community could claim to be "on the map" until it could first claim to have a post office. Postal service and civic pride thus became intimately linked, which helps explain why villagers today will go to such imaginative lengths to preserve their post offices.

Of the 30,155 post offices still extant, at least half continue to operate in rural areas. Those that do

At Loryce Hawn's post office in Fitler, Mississippi, you get stamps anytime—and credit (except Sundays).

Saving the small-town post office

Laurie Pecci, a substitute carrier, unloads mail at P.O. in Phippsburg, Maine, a town of about 1,400 people.

Postmaster Evelyn Shealy, who has been on the job almost 13 years, lowers flag at Ochopee, Florida,

a brisk business are usually housed in buildings suited to their lofty fiscal status: brick on the outside and dark oak within. They bespeak a federal presence. Most of the others are consigned to more humble quarters, frame dwellings that may also do duty as stores or luncheonettes. As often as not there is a metal box for ice cubes out front, along with one or two gas pumps. Inside, one is likely to find a long wooden bench where citizens can pass the time of day.

These modest establishments define many an American village. In addition to gas, each P.O. pumps life and meaning into its community. As a village resident you will be hailed and humored the instant you walk through the door; you will be entitled to the friendliest of service simply because you exist. The postmaster may wrap a package for you, advise you on filling out your tax forms, search for rare stamps if you're a collector, tell you who's ill and who's getting married, even keep your house keys while you go visit your Aunt Sophie. Because the rural post office is a model democratic institution, every citizen is king.

The postal struggles that often occur in America's small towns have gone largely unnoticed by the rest of

post office. Considered to be the smallest P.O. in the nation, it stands some 70 miles west of Miami.

us, yet they are persistent and impassioned. At bottom, they represent rural America's instinctive stand against all the "-ations" that for more than a century have been chipping away at its sense of worth: industrialization, urbanization, bureaucratization, consolidation. To rural residents, such shibboleths of progress spell liquidation. The response can be astonishing.

A case in point is Claiborne, Maryland (population: 217), a Chesapeake Bay village whose dwellings are as clean and white as spindrift. When residents there learned that their beloved but unprofitable post office might be eliminated, they rushed to buy stamps, instantly tripling the P.O.'s normal volume of business. Roy Dyson, the local congressman, caught the fever and bought 2,000 20-centers for his Christmas mailings. Rep. Lindy Boggs of Louisiana, a descendant of the original William Claiborne, drove over from Washington and bought 4,000 more. "I can't remember a closing that has caused this much hubbub," said Stanley Menashes, a Delaware postal official.

Richard J. Margolis is currently writing a book about rural Americans and their endangered institutions.

Martha Hamlyn (p. 69), who handles the Claiborne mail and helps her husband run the adjacent general store, knew the reason why. "We're the only anything here," she said.

Recently I visited a number of villages where the post office is "the only anything," focusing on P.O.s that were either marked for extinction or for some other form of "progress." As might be expected, Fitler was near the top of my itinerary.

The P.O. has "more use than meets the eye"

The petition Fitler sent to the Postal Rate Commission (PRC) got right down to cases. "Most of us cannot read or write," it began. "The Post Lady does all the reading and writing [for us]." Furthermore, "Most of us don't own cars and would have to pay for rides to the Onward post office. . . .

"We would like to see our post office open and would like Loryce Hawn to run it for us. We trust her to take care of our business. Millions of dollars are spent on other programs, why not help us out on one of the best programs there is to help the community?" And then the clincher: "The post office has more use than meets the eye."

To the PRC, Fitler's impassioned appeal was all in a day's work. The PRC is a watchdog agency that Congress created in 1970 when it reorganized the U.S. Postal Service, converting it to a quasi-private enterprise that was expected to break even. One of the agency's minor duties has been to rule on appeals like the one that arrived from Fitler—a responsibility that Congress assigned it in 1976 when passing an obscure but critical amendment aimed at protecting small post offices. Sponsored by Senator Jennings Randolph of West Virginia, the amendment calls on the Postal Service to "consider the effect . . . on the community" when "making a determination to close or consolidate a post office."

In speaking for the amendment, Senator Randolph perfectly mirrored the feeling of his rural constituents. He reminded his colleagues that "When the post office is closed, the flag comes down." He told them about Bessie Sparks, the postmaster in Daniels, West Virginia, who "makes us all feel welcome." Finally, he issued a warning: "When the human side of government closes its doors, we're all in trouble." The amendment passed without serious opposition.

Over the years some 80 rural communities have managed to make formal appeals. At first the PRC nearly always sided with the petitioners, usually on grounds that the Postal Service had failed to explore "the effect on the community." But since 1981—when the Postal Service finally got its act together, and when

Fitler's "Post Lady" makes up lunches for customers in her general store, which also houses post office.

Dwinal Tripp fetches his mail from box in post office at Hope, Maine, where his daughter is a clerk.

a thrift-minded administration came to Washington—the Commission has permitted many more shutdowns. Last year it rejected 15 of 18 appeals.

The Fitler appeal in 1978 easily prevailed, with the five-person Commission unanimously concluding that "the Postal Service had made insufficient findings with respect to the effects of the closing on the community." But postal officials were not yet finished with Fitler. In 1981 they quietly downgraded the village's pride and joy from a "Fourth Class" to a "Community" post office, a demotion that in effect put it beyond reach of appeal. Henceforth the Postal Service could shut down the Fitler P.O. without troubling to explain itself to the Commission.

The change deprived Mrs. Hawn of postmaster status and placed her on a minimum wage schedule without fringe benefits. She is paid $166 a month now, a sum the Postal Service claims is adequate compensation for her keeping the post office open three hours each day. In fact, she doubles as the Post Lady whenever she is in the store, which is most of the time.

The day I visited it was already "after hours," but people kept coming to the P.O. window. Willie Maxey and Sylvester (Popcorn) Caldwell, both seasonal farm workers, bought money orders to pay their telephone bills. ("Today is payday," Mrs. Hawn explained.) An elderly woman asked the Post Lady for help in wrapping a package she was sending to her grandson in Jackson. Others dropped in to collect their mail.

Nearly everyone who stopped by stayed to chat, to play pool in the back of the store or to sample some of Mrs. Hawn's homemade chili (60 cents a bowl). "People just come here to sit around," she told me as she vigorously swept the floor. "You have to have time to socialize."

She put the broom away and went to switch off the mock-Tiffany lamp that hung above the pool table, remarking that her electric bill last month had come to $599. "It's kind of hard sometimes, but I can't say that I mind. These are my people. I'd take care of them for free, if we could only keep our post office."

Fitler's postal attachments are hardly unique. Wherever I went, whomever I interviewed, I found the same affection and heard the same expressions of regard. One day in Colo, Iowa, Mayor Clay Carmody, a farmer, recalled the information he had gathered that morning during a five-minute visit to the P.O.: "Where the fish are biting . . . how the crops are doing . . . my friend Joe's going to have x rays tomorrow . . . there was a fire last night in the Krebs' backyard . . . there's talk of a tornado warning tonight."

The crop and weather news that Carmody picked up were vital to Colo's welfare. No less so were the fishing tips, because for quite a few Colo families to know where the fish were biting was to be assured of dinner that night. In addition, the talk about Joe's x rays alerted Carmody and others to the possibility of serious illness; Joe's family might need help.

In Milroy, Minnesota, I happened to visit the P.O. soon after a grisly post-wedding highway accident had killed the bridegroom and seriously injured the bride. The talk that morning ran to funeral arrangements

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and to ways the neighbors could help the bereaved. In flat, respectful tones they assigned each other tasks: the cooking of meals, the purchasing of flowers, the notification of friends and relatives.

Families being what they are, village children often get pampered at the P.O. As Mrs. Edna Pugh, the former postmaster in Montrose, Mississippi, cheerfully confessed, "I spoil them something awful. Mostly I give them Tootsie Rolls, on account of they don't seem to like peppermint." (Alas, there's no more candy to be had at the Montrose P.O. A few weeks after my visit, the PRC turned down a Montrose appeal and the post office was closed.)

The picture that emerges is of an institution that welcomes all comers and serves as a refuge for all seasons. Ultimately, I think, it affords villagers a bit of safe, friendly turf in a vast and scary universe. The tie that binds citizens to their post offices seems part mystic and part egoistic. "We're kind of a proud people," Mrs. Pugh told me. "We want it known that we live in Montrose and not someplace else."

A lovely passage in Thornton Wilder's *Our Town* allows us to savor the mystery:

> *Rebecca*: I never told you about that letter Jane Crofut got from her minister when she was sick. He wrote Jane a letter and on the envelope the address was like this: It said: Jane Crofut; the Crofut Farm; Grover's Corners; Sutton County; New Hampshire; United States of America.
> *George*: What's funny about that?
> *Rebecca*: But listen, it's not finished: the United States of America; Continent of North America; Western Hemisphere; the Earth; the Solar System; the Universe; the Mind of God—that's what it said on the envelope.

In setting down these accounts it is hard not to portray the Postal Service as a cost-obsessed villain, but Congress has ordered it to keep out of debt.

It must be said, too, that rural post offices have been going out of business since before the Civil War. Attrition began in earnest 87 years ago when Congress established Rural Free Delivery, a reform that brought mail service to millions of previously isolated families but rendered a large number of post offices obsolete, the farmers preferring to have their mail delivered. Some 26,000 small post offices disappeared between 1901 and 1925—and with them, in many instances, the communities they had served.

While no one in Washington these days is suggesting that the Postal Service close *all* its rural facilities, the General Accounting Office (GAO), a research arm of Congress, has come remarkably close. A 1975 GAO study called for the elimination of 12,000 rural post offices and promised annual savings of $100 million.

Not surprisingly, the study enjoyed a cordial reception at the deficit-ridden Postal Service struggling to live up to Congress' mandate. That alarmed some rural congressmen, who then pushed through the Randolph "Effect on Community" amendment.

But to GAO researchers, retreat was apparently unthinkable. Last year they issued yet another set of hopeful estimates. This time they projected annual savings of up to $150 million if the Postal Service would only "replace about 7,000 limited mail service [*i.e.*, rural] post offices."

The new report drew a quick disclaimer from Postmaster General William F. Bolger. "In our view," he declared, "it is clearly in the public's interest to maintain an effective and convenient Postal Service. This is not accomplished by rapidly changing the structure of the postal system as the GAO has outlined."

When I talked later with Mr. Bolger, he was still more reassuring. "I have no truck with policies that make rural post offices a prime target," he said. "I'm not about to pursue that many closings."

But let Loryce Hawn, that gentle village skeptic, have the last word. "People in Washington," she said "just go by the book. They don't hold with personal circumstances." She might have said more, but she was interrupted by a young man sporting a red beard and a "Mississippi Rebels" cap, who wanted two 20-cent stamps. Mrs. Hawn had to advance him the 40 cents from her own pocketbook. "You can pay me later," she told him. "It's no big thing."

Martha Hamlyn tends baby and handles mail at Claiborne, Maryland, P.O.—"the only anything here."

postal bulletin

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Audi: the art of engineering.

By Paul J. Karlstrom

Henri Fantin-Latour, master of 'persistence before nature'

Nelson-Atkins Museum of Art, Kansas City

Still full of dreams and plans to change French art, he came to live reclusively and paint works of quiet, vibrant beauty

In the glittering art world of 19th-century Paris, an age of creative giants, Henri Fantin-Latour worked quietly and reclusively making paintings which, if not revelatory or innovative, were of a very high order, capable of giving sustained satisfaction to anyone who looked at them.

It is not very surprising that other painters of his time are better known, considering who they were, and it is not unjust, either, for they included Manet, Monet, Degas and Renoir.

Nearly two years after his death, the critic René-Marc Ferry wrote of Fantin-Latour: "When he found realism too limited and stifling, he lost himself in dreams, but his dreams went no further than the windows of his studio. . . . He narrowed life to be better able to work the modest and secluded furrow he had staked out for himself."

These few words create a succinct and still accurate portrait of the artist. And they suggest both the virtues and limitations of his art, while pointing the way to an understanding of his place in the art scene of the time.

Fantin embraced the Realist doctrine that close observation of nature, including its most humble aspects, led directly to truth. This basic belief remained a guiding force throughout his career. His story is one of conflict between the demands of Realist "truth" in an era of intellectual Rationalism and a growing need to release the inner forces of subjective fantasy.

He spent his early years at the very center of creative activity in Paris. Through his friendship with Whistler he also made influential contacts in England, which he visited several times over the years and which provided an important market for his floral still lifes. Despite these close associations and the shared commitment to "rejuvenate" French art, eventually Fantin became alienated from his friends, especially those who introduced Impressionism as the logical evolution of Realism.

It's clear why *Annual Chrysanthemums* was so appealing in 1889, when painted, as well as today.

City of Manchester Art Galleries, England

Fantin-Latour entered this moody self-portrait in the Paris Salon of 1867. He was 31 at the time.

Exactly where, then, does Fantin belong in relation to the main tendencies of his day? Why did he abandon his more progressive comrades, yet at the same time retain their respect? Was he a Realist, a Symbolist or simply a popular painter of exquisite still lifes, restrained portraits, and imaginative fantasies largely based on musical sources?

These are among the intriguing questions raised in a major retrospective organized by the Réunion des Musées nationaux in France and the National Gallery of Canada in conjunction with the Fine Arts Museums of San Francisco. In its only United States showing, the exhibition is on view throughout the summer at the California Palace of the Legion of Honor.

This is the first opportunity since a 1906 retrospective in Paris to study in depth the three main categories of this problematic artist's work. Almost 150 important paintings, drawings and prints have been assembled by curatorial coordinators Douglas Druick of Canada's National Gallery and Michel Hoog of the Musée de l'Orangerie. The thoroughness of research involved in preparation of the exhibition and its scholarly catalog is indicated by, for example, the horticultural attention to the still lifes. The flowers are authoritatively identified in the catalog entries. Not least among its various attractions, the exhibition

Los Angeles County Museum of Art

The artist, who was a great admirer of Wagner, painted *Tannhäuser: Venusberg* in 1864 as a work of homage. It depicts the opening scene of the opera, with Tannhäuser and Venus portrayed at lower left.

serves up a visual feast for those who are delighted by flowers.

This is as it should be, because, as was the case during his lifetime, Fantin is best known in this country and in Great Britain for his floral still lifes. Even in France, where his reputation has been based upon group portraits such as the famous *Homage to Eugène Delacroix* (1864) and *An Atelier in the Batignolles* (1870, opposite), his preeminence as a flower painter was such that Proust mentions him in *Remembrance of Things Past* as a measure of excellence in the field.

Throughout his career Fantin produced hundreds of still lifes and as a result has been described as a formula painter. Repetition is a predictable criticism of his work. However, his reasons for so limiting himself do him credit: for Fantin, still life came to represent the love of painting for itself rather than as a subordinate to subject matter. Essentially a painters' painter, Fantin understood the challenge involved in "getting it right." His flowers represent a commitment to unlocking the secrets of the image through "persistence before nature," a virtue often appreciated more by artists than critics and art historians.

The second major area of Fantin's work, the commissioned aspect of which he equated with prostitution, was his portraiture. Typically, he avoided much contact with his sitters. Portraits such as *Mlle Charlotte Dubourg* (p. 77) are actually human still lifes which the artist himself described as "studies from nature," indicating once again his Realist goals. Certainly his personal shyness contributed to the barrier between artist and subject, but interest in appearances rather than psychology or human interaction is a more basic explanation for the contrived and static quality of some of his portraits. Among the striking exceptions are the early self-portraits—introspective, brooding and

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Musée d'Orsay (Galerie du Jeu de Paume), Paris

An Atelier in the Batignolles (1870) shows Manet, brush in hand, with, from the left: Otto Scholderer, Auguste Renoir, Zacharie Astruc (seated), Émile Zola, Edmond Maître, Frédéric Bazille and Claude Monet.

romantic—partly inspired by Rembrandt's example.

In his portrait groups, Fantin was paying tribute to the idea of artistic fraternity as symbolized by individuals whom he knew and admired. *A Corner of the Table* (1872), originally conceived to honor Baudelaire, evolved to become a more general tribute to modern poetry. The same expression of Fantin's abiding interest in music and literature, and his attraction to Wagnerian ideas of the interconnectedness of the arts, appears in *Around the Piano* (1885).

Fantin's profound interest in music, particularly in its most "romantic" expressions, led to his involvement with the Wagnerian avant-garde, which in turn validated his impulse to poetic fantasy first manifested in the 1860s. Fantin's art came to be identified with music and was interpreted within the context of Symbolist ideas and their emphasis on the senses.

In the end, however, Fantin adopted a middle road, vacillating between objective and subjective goals. He was also something of an intellectual moralist who resisted the considerable temptations of Parisian life while, at the same time, being irresistibly drawn to the sensual realm of dream and fantasy. The fleshy female nudes of his Wagnerian subjects (opposite) suggest that he may have found a satisfactory outlet for his personal fantasies.

He began as a dedicated Realist committed to straightforward observation of nature. But increasingly his spirit longed for release from the narrow studio confines that he had imposed upon himself and his subjects. Escape came through the free style and romantic fantasy of his imaginative works. Fantin's security, however, lay in depicting cultivated nature rearranged within the studio, where he worked until his death in 1904. Ironically, the man who always had been concerned that the passing of great artists was not properly marked by an unappreciative public, was widely mourned and eulogized.

The current exhibition should encourage consideration of Fantin for his own merits as a painter rather

than for his associations with more illustrious colleagues, comparisons with whom have adversely affected his reputation and obscured his artistic personality. He was an individualist, a sensitive and committed artist who apparently recognized his own limitations and wisely concentrated on his strengths. Although hardly a hallmark of greatness, his decision to devote himself to a few carefully selected subjects and fundamental problems of painting should be viewed as a genuine, albeit modest, virtue. Apparently Fantin's friends and acquaintances—Manet, Renoir, Degas and Monet among them—perceived it as such, for they continued to respect him as a serious painter despite his esthetic conservatism. Fantin-Latour was never a groundbreaker, but he remained true to his own vision, and his artistic integrity confronts us in a body of work distinguished by thoughtful contemplation of art in the service of idealism.

The Fine Arts Museums of San Francisco

White Rockets and Fruit, 1869, was one of many works sent to England, where they were very popular.

Charlotte Dubourg, the artist's sister-in-law, was the enigmatic beauty in this 1882 painting.

Musée d'Orsay (Galerie du Jeu de Paume), Paris

By Lewis Simons

New Jersey shows a different face in this bewitching province of pines

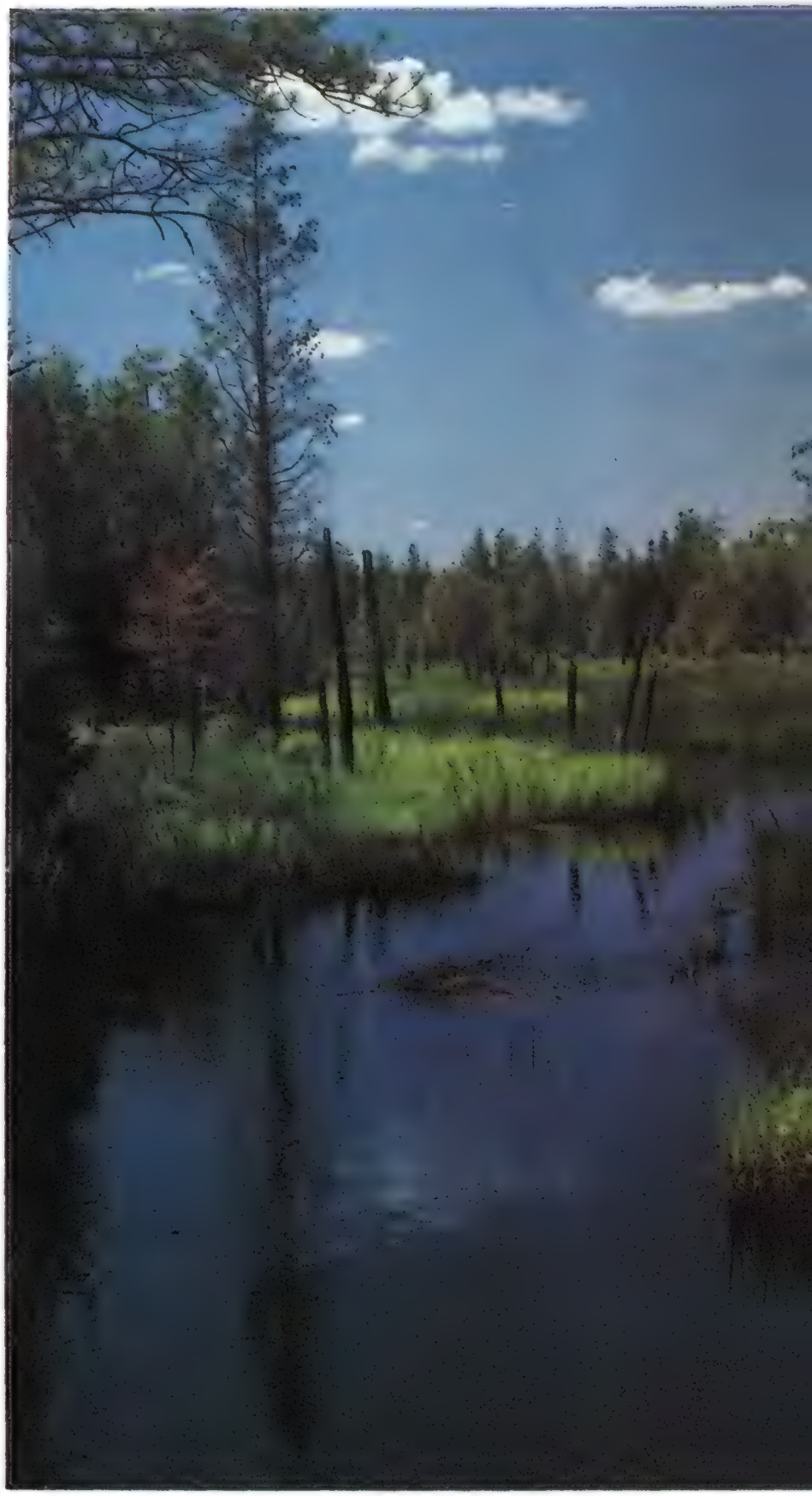
It's a nature-lover's delight just two hours from Manhattan—about a million acres of woods and water known as the Pine Barrens

New Jersey, the most crowded state in the Union, has been the hapless butt of put-down jokes for years. (Question: What's worse than a weekend in Calcutta? Answer: A Saturday night in Secaucus.) My teen-age cousin, Craig, has spent his entire life in northern New Jersey and to him it is no laughing matter: row upon row of look-alike houses, congested highways lined with used-car lots and shopping centers, one dying city after another, and people, people, people.

I'm a Jersey boy, too. I was raised in Paterson, once known as the "Silk City" of the northern textile industry. For me, the essence of my home state boils down to the foul-smelling chemical plants and refineries that sprawl alongside the New Jersey Turnpike near Newark.

Given our decidedly urban impressions of New Jersey, the last thing Craig and I ever expected to find there was an authentic wilderness. But last summer, to our great surprise and everlasting delight, that is exactly what we did find—less than two hours away from downtown Manhattan. We drove for hours along sandy roads cutting through dense thickets and woods. We backpacked for miles on a winding path called the Batona Trail. We canoed down the enchanting Mullica River and seldom saw another soul. We knelt to drink cool water from fast-running streams—*New Jersey* streams, mind you!—as pure as any in the East.

The remarkable place where all of this happened is known as the Pine Barrens. It overlies most of the bottom half of the state, reaching 70 miles from Cape May in the south on up toward the "waist" of New



It looks like northern Wisconsin but it is the Batsto River in South Jersey, where deer and birds reside.

Encumbering a brushy bough, greenbrier berries grow in the Pine Barrens, leaves aglow with autumn's hues.

Photographs by Robert Noonan

A "Piney" born and bred, Mary-Ann Thompson sips pure water at a pond near her father's cranberry bogs.

Jersey between Trenton and Lakewood, and westward from a point near Atlantic City, on the ocean, almost to the Delaware River. Encompassing some 2,000 square miles in all, it is an intriguing patchwork of towns, farms, orchards, commercial cranberry bogs, forests and wetlands. For hikers, bird watchers and other nature lovers, its chief attraction is a 338,000-acre core of mostly undeveloped private and public land in and around four state forests: Wharton, Bass River, Penn and Lebanon.

This territory, dotted with sparkling ponds and lakes, is considered the primeval heart and soul of the Pine Barrens. That name is a curious misnomer, because although the region is full of pitch pines, short-leaf pines and even pygmy pines, it is anything but barren. It sustains more than 80 bird species, dozens of reptiles and amphibians, including the endangered Pine Barrens tree frog, *Hyla andersoni* (cover), and many deer, fox, raccoons and other creatures. The diverse vegetation includes, in addition to the ubiquitous pine trees, varieties of oak, cedar and magnolia, shoulder-high blueberry shrubs, myrtle, azaleas and a great many wild herbs.

The region's most abundant and, in some ways, most important natural resource is buried underground. The Pine Barrens' bristly surface stretches across beds of sand and gravel hundreds of feet deep. These contain about 17 trillion gallons of fresh water. The surface water is unappetizing in appearance because of its tea-brown color—the harmless result of dissolved organic materials—but it is drinkable in certain places. The Cohansey aquifer, as this huge subsurface reservoir is called, presently provides water for most of the area's 400,000 residents.

Another resource not to be overlooked in the Pine Barrens is the people who live there. Although much of the region is wild, it is not pristine and it hasn't been for a long time. The first settlers moved in more than two centuries ago. Since then, industries (iron for cannon balls was mined here during the Revolutionary War) and entire villages have come and gone, but some descendants of the earlier pioneers are still around. A number of them live at least partly off the land, farming, hunting, woodcutting and berry picking. They call themselves Pineys and in their woodsy lifestyle and characteristic speech patterns they are as culturally and sociologically distinct as the hill people of Appalachia and the briny island lobstermen of Maine. There is Piney music and even Piney cuisine, such as the thick, hearty snapping-turtle soup so highly esteemed by these locals.

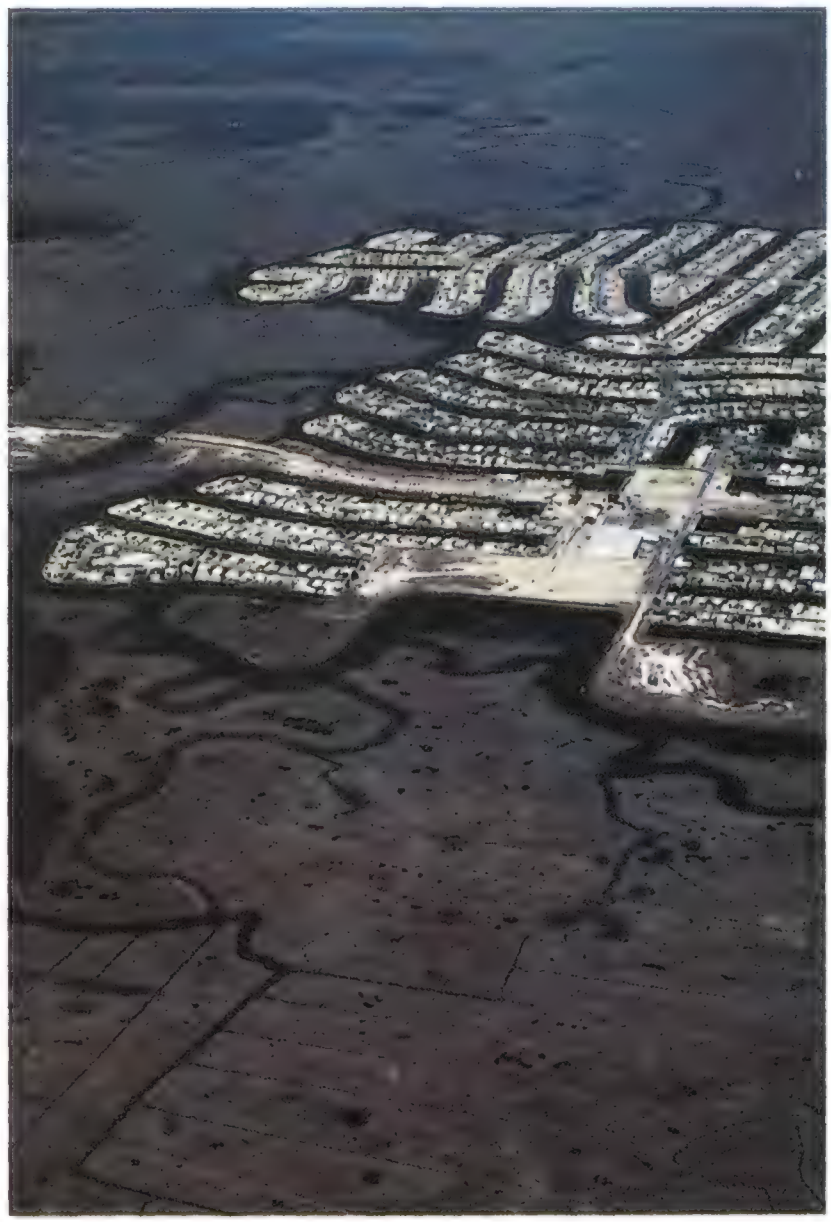
Formerly a Washington Post *reporter, Lewis Simons is currently on assignment as a correspondent in Tokyo for the Knight-Ridder newspaper group.*

Cranberries are a major crop in the Pine Barrens now, but increased development is a threat to some growers.

Jimmy Bakely takes a break in the Thompsons' 1890 cranberry house, where he has worked for 20-odd years.

The Pineys love their land in the same way that they love their families and, indeed, for most of them the two are almost inseparable. Some Pineys try to leave but, like Wilbur Higgenbothem, end up coming back. Wilbur played guitar and harmonica with a country band that traveled to Atlantic City and the Pennsylvania Dutch country. Then he started homesteading in Paisley, a handful of humble little homes in the woods. There, on nine acres which he says he bought in 1945 for less than $200, he built a house out of pine and cedar wood and raised seven children with his wife, Anna. He works part of the year in a nearby cranberry bog and raises strawberries, blueberries, raspberries and vegetables, some of which his family eats and some of which he sells. "It's hard to get by," Wilbur told Craig and me, "but out here at least you can always find something to eat. And you can always gather pine cones, moss and birch logs to sell. My brother-in-law does gathering full time."

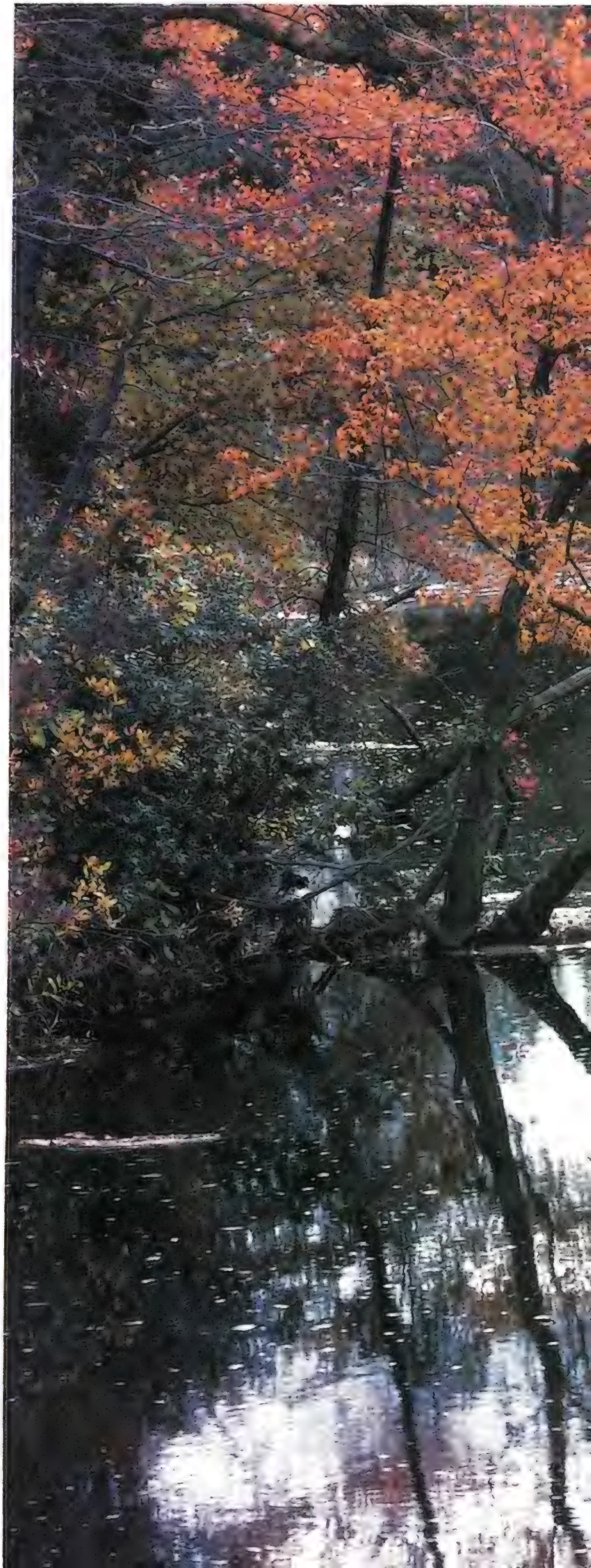
Gathering! I thought it had gone out with the Indians of pre-Colonial America. Yet here were people who still earned a living gathering wild things in the forests. "We get $7 a thousand for pine cones," Anna told us. "Some people, if they're really fast, they gather 10,000 in a day. You can't afford to walk. You run from one tree to another, and you lose all the meat and skin off your shins, too." Once, Wilbur tied stovepipes around his shins to protect them. "But with them on," he said, "I couldn't run very much."

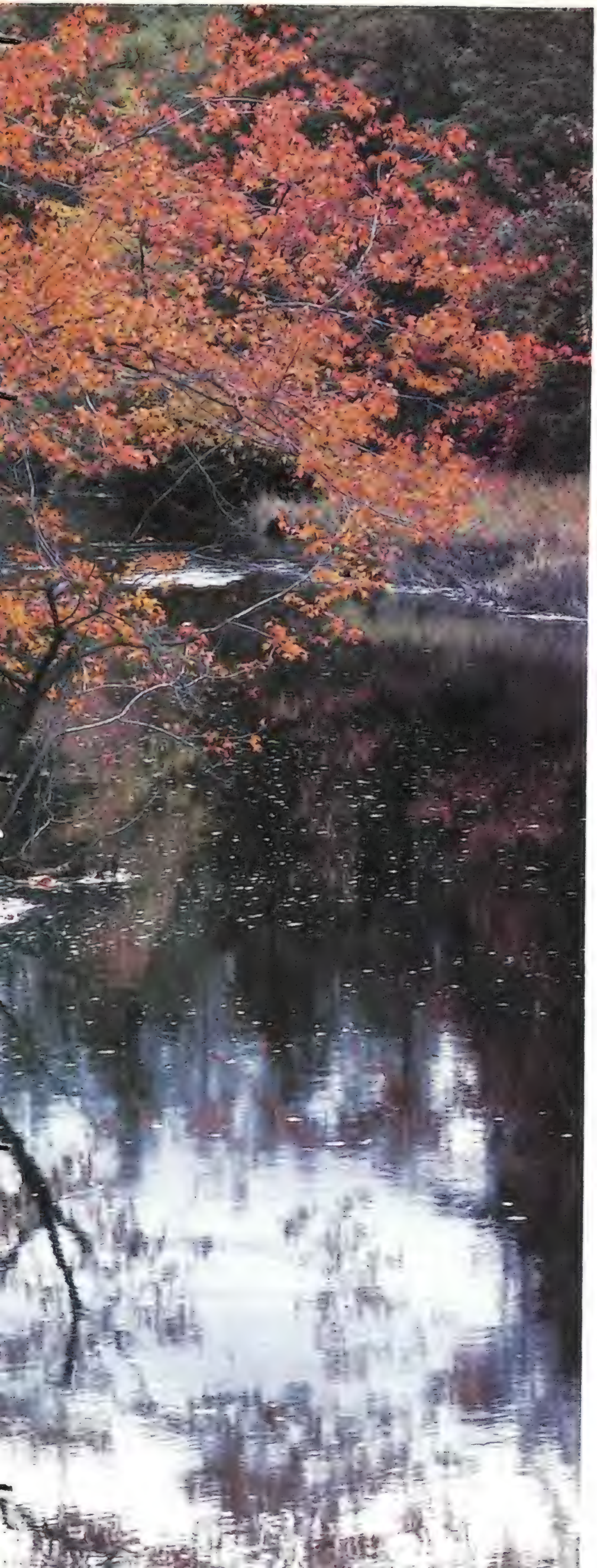


A harbinger of things to come? Large housing tract called Mystic Islands spills across coastal lagoon.

In bogs and ponds, the nubbly stalks of golden club blossom every spring into brilliant yellow spears.

Carnivorous denizen of the boglands, a pitcher plant lures insects into its throat—and consumes them.





Eyes agog beneath its fuzzy crown, a young red-winged blackbird perches unsteadily on a slender cedar sprig.

A spider nestles in the blossom of a Rose Pogonia orchid, a plant that usually thrives in damp locations.

Dreamily sweeping past a fall-tinged tree, the Wading River is an oasis of calm 25 miles from Atlantic City.

Pine Barrens gentian is one of several endangered plant species on the reserve. It flowers in the fall.

Wilbur paused for a moment. He had been weeding his strawberries and now he flicked a bead of sweat out of his eyebrow, slapped a mosquito and squinted into the sunset as he thoughtfully considered a broader issue. "One thing I can't understand is why anyone would ever want to develop this land," he said.

Some people see nothing wrong with development and quite a few are actively engaged in it. An hour's flight over the Pine Barrens in a light plane vividly reveals how successful they have been. Enormous retirement communities leap out of the deep green forests, their serried rows of little homes edged by red earth, gouged by bulldozers and backhoes. New housing developments, highways, power lines and garbage dumps make their prominent marks on the fragile landscape, too. The sprawling glitter of Atlantic City lies only moments away from the peaceful center of an immense wetland. As the plane turns north we can see both the Garden State Parkway and the New Jersey Turnpike grasping the pinelands between them like a pair of giant calipers.

The trouble with all of this has mainly to do with its potentially devastating impact on the region's precious water supplies, and on the Pineys' bucolic way of life. To the extent that the Pineys depend on farming, berrying and gathering for their subsistence, any significant encroachment upon their lands casts a shadow over the future. As for the Pine Barrens' aquifer, it is, partly owing to its porous condition, particularly vulnerable to pollution and poisoning by septic-tank systems and garbage dumps. Another threat is posed by toxic dumps full of chemical wastes that have been delivered by trucks from industrial sites far beyond the Pine Barrens. Even now, experts say, this material is slowly but surely leaching into the water.

Development and land speculation have been going on in the area for decades, but it was not until the mid-1960s that conservationists began to fight for a more rational approach to growth. In 1978, largely as a result of their efforts, the Pine Barrens became one of the first "reserves" established under the National Parks and Recreation Act. A reserve differs from a park in that it may, like the Pine Barrens, consist of a smorgasbord of federal, state, local and private lands (about two-thirds of the Pine Barrens is privately owned).The point of creating this reserve is to reconcile preservation and development through enlightened land-use planning.

Uncle Sam helps divide the pie

The Pinelands National Reserve got off to a promising start when U.S., state and local planners came up with a comprehensive management proposal that was approved by Interior Secretary Cecil Andrus in one of the last acts of the Carter Administration. The master plan sets aside a little more than a third of the Pine Barrens for wildlife, recreation, forestry, very limited building, and some cultivation of blueberries and cranberries. (New Jersey, surprisingly enough, produces more cranberries than any other states except Massachusetts and Wisconsin.) But there's a place for more extensive development in the plan, too. The other two-thirds of the reserve is split up into blocks of land which are categorized according to their environmental sensitivity. These range from extensive forest areas with strict limits on residential and commercial growth to town areas where local interests are free to do pretty much as they please.

If the preservationist spirit of the master plan is honored in its implementation, then future generations will be able to enjoy the same kind of carefree communing with nature that preoccupied Craig and me on our recent visit. One afternoon, for example, we kicked off our shoes and went wading through a bog that couldn't have looked more unappealing from the road. But when we bent down close to the muck, we found it teeming with some of the most fascinating

plant life on the face of the Earth: the sundew, an insectivorous plant that dissolves ants and flies which unwittingly hang themselves up on its red-tipped, delicate hairs; rhubarb-pink pitcher plants, which exude a nectar that lures unwary insects; the curly-grass fern, as pale green in the spring as the heart stalks of pascal celery, as gently curved as the throat of a violin, and no longer than a baby's finger. This was beauty in microcosm.

I felt like Gulliver in Lilliput

There is beauty in macrocosm, too, but some of those views struck me, at times, as a little forbidding. Some tracts of immature pygmy pines, for example, are about three feet tall, rough in texture and bizarre when you stand in their midst. Peering across their tops, I felt like Gulliver in Lilliput.

One night we bunked at an old Victorian house sandwiched between the pines and bogs. I was dead tired from all our wanderings and the mattress laid out on the floor felt positively luxurious. I was all but fast asleep when the sound began outside. Something like *quonk, quonk, quonk*. Deep. Big, in fact, though the creature that made it was not big at all. The noise came from the Pine Barrens tree frog, a finger-length creature, green in color with a distinctive lavender stripe running down each of its glistening sides. Its call was a lullaby I shall not soon forget.

One of the special things about the Pine Barrens wilderness is that it's so easy to get into. It is possible, for instance, to park your car next to the abandoned New Jersey Central Railroad bed just south of the hamlet of Atsion in Wharton State Forest and to strike off down the rusty tracks. Within minutes, you are in another world, a world of toads and turtles, buzzards and butterflies, skunks and snakes. Goldfinches are chipping and whistling in the pitch pines and red-winged blackbirds are *konk-la-reeing* in the bogs. Here and there, if you look carefully, you may even come upon the endangered Pine Barrens gentian.

At a junction of the tracks with a narrow dirt road, you may notice that the mud in a hollow looks like a page torn from a footprint field guide. Carelessly drawn just a few hours ago, these marks now appear almost fussy in their precision, and therefore they are unmistakable. That's the catlike imprint of a skunk and this is where a fox made its dainty way. The child-like business over there is a raccoon's fingery impression and, over here, next to the deer's cloven signature, this is a possum's tail dragging on the ground. It was, from the looks of it, a busy night for critters, but not for people; no sign of them here at all.

This is a good place for quiet encounters, if you are patient. Sit for a while on the bank of this soupy bog

Threadleaf sundew, another carnivorous plant, traps prey (below) with sticky fluid secreted by its hairs.

This unlucky ant, glued onto a sundew's glistening hairs, is destined to be digested in a matter of hours.

Turkey-beard grass grows in clumps throughout Pine Barrens. It is sometimes used for basketmaking.

and the sunning turtles that slid off the log when you arrived a few minutes ago will return, hauling themselves back out one by one. You can hear their claws scratching on the wood. Get up now and watch them, startled, dump themselves in once again—all except that big one on the end. It looks, blinks, cranes its neck to make sure, seems almost to shrug, and reluctantly pivots on its belly, claws rasping. *Plop.*

A little farther down the tracks, with the sun warm on your back and the wind mussing up your hair, you find a couple of bleached fox scats lying between the ties and, digging with a stick, you separate the stiff outer hairs to reveal a core of olive-colored organic matter. It is powdery and flecked with fragments of bone. Nearby, at the base of a pine sapling, you find another scat—dried berries, mostly. Crushing several of them, you notice brown little buttonlike seeds, burnished as brightly as mother-of-pearl. These are the seeds of the greenbrier berry, a meager fruit raccoons and other animals usually don't bother with until winter, when there's little else to be had.

Still kneeling, you look up and see the deer. It is ambling across the tracks a couple of hundred feet upwind from you. It seems to be just moseying around, and when it heads down the embankment, you follow, walking softly, gaining on it. How close can you get? Suddenly a ruffed grouse explodes into flight ten feet away, scaring the daylights out of you and the deer. Flicking the white underside of its tail straight up, your quarry bolts for cover.

Walking back to the car, you notice that this part of the railroad bed is being absorbed by the wetlands on either side of it. It's sinking. The timbers are rotting. Grass is matting over the gravel; pine and oak saplings are taking firm root between the ties. Eventually, as the water continues to soften the embankment and the vegetation grows apace, even the rails will start to disappear and some day this conspicuous cut will be no more. It will be healed.

But although the healing process has indeed begun in certain parts of the Pine Barrens, some conservationists are concerned these days that unnecessary and perhaps even illegal damage is being inflicted elsewhere. In the past two years, they contend, there has been some serious slippage in the implementation of the master plan. Not surprisingly, some developers and municipal officials disagree.

"Conservation victories are never permanent," says Mary-Ann Thompson, the 34-year-old daughter of a local cranberry grower and one of the area's leading activists. "I am worried because too many people are complacent."

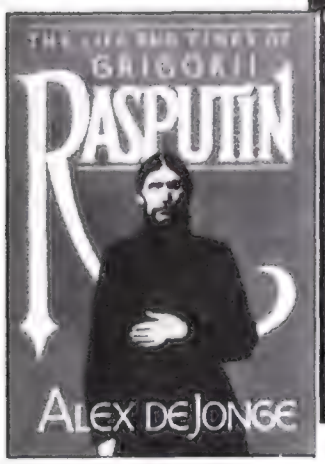
Mary-Ann is another one of those who left the Pine Barrens only to return. She earned a law degree at Cornell and attended graduate school in London before working as a legal counsel for former New Jersey governor Brendan Byrne and then as a Congressional aide in Washington. She's now practicing law in Vincentown and helping her father on the cranberry farm. The business employs 17 people at harvest time and helps support seven families, including that of Jimmy Bakely, age 38, who grew up in nearby Tabernacle and now lives on the premises.

What brought Mary-Ann back to her homeland in 1977 was the struggle to protect it. She is determined to see that the wilderness remains wild, that the water stays pure and that the area's 50 remaining cranberry growers (down from hundreds some 35 years ago) stay in business. That's just fine with Wilbur Higgenbothem, who works regularly for Mary-Ann's dad. "They've already taken away too many good farms," he grumbled when Craig and I stopped by. "People who don't even know how to grow a tomato."

With that, Wilbur reached out with a large, roughened hand and scooped up his young grandson, Nicky. Barefoot, white-blond and, like his granddad, red-faced, the little boy moved with the loose-limbed sure gait of the child at home in the woods. The grandfather hoisted him up, like a sack of pine cones, and bounced him on his knees. "This boy wouldn't know what to do without these pines," the grandfather said, and Nicky laughed and squealed.

The extremely rare curly-grass fern, only inches high, unfurls its delicate fronds near a cedar swamp.

SAVINGS THAT GO DOWN IN HISTORY



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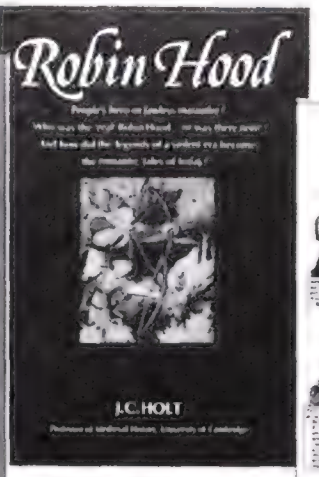

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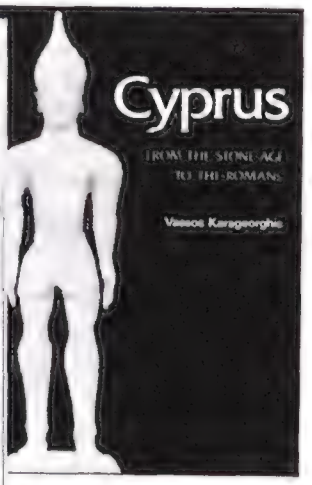

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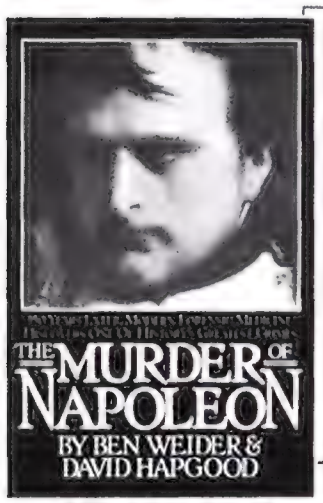

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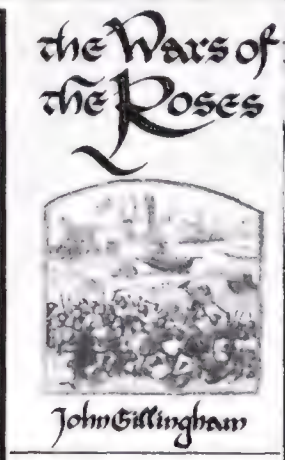

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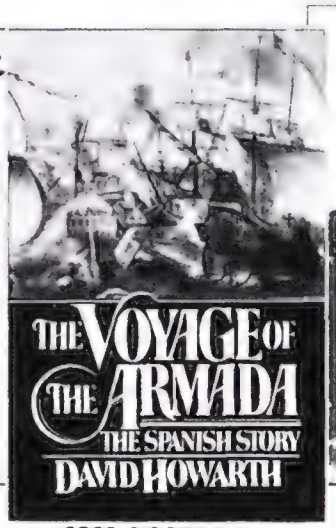

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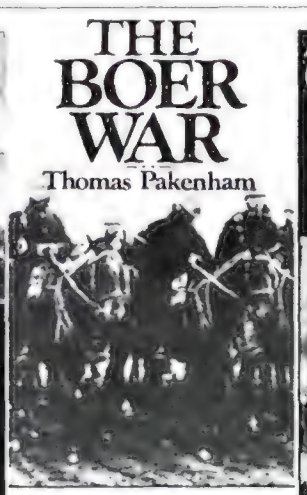

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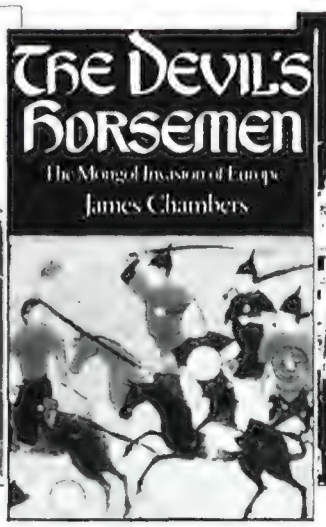

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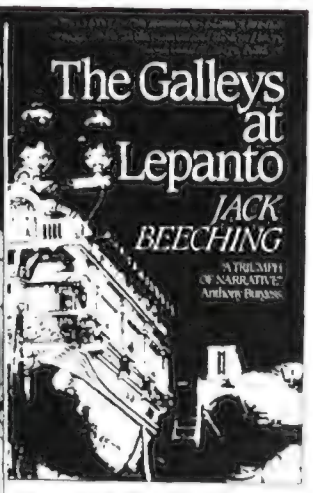

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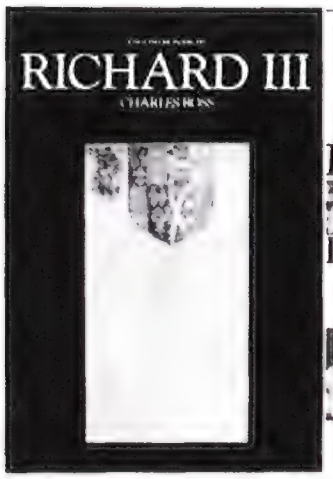

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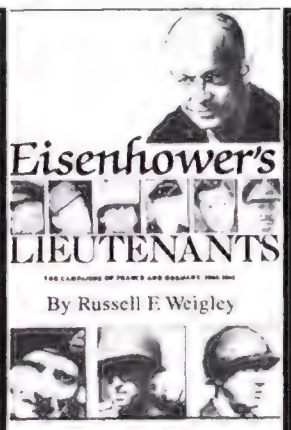

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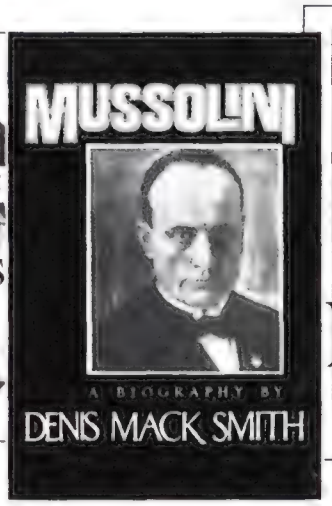

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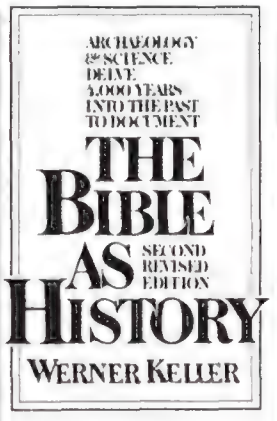
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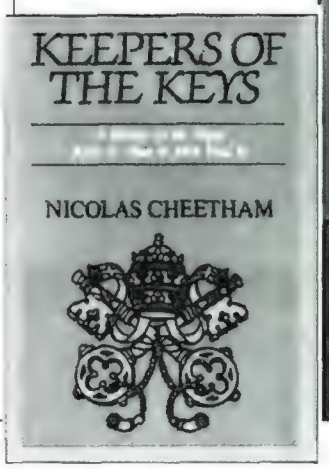

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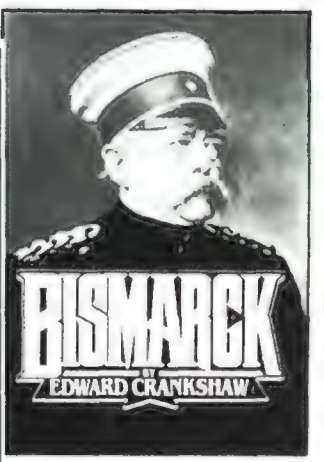

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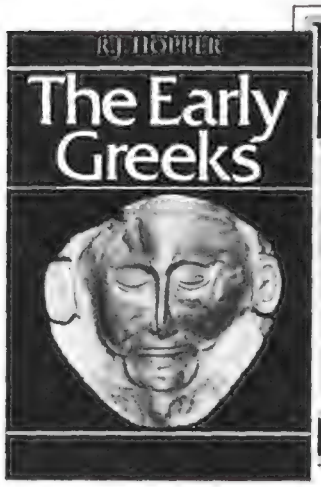

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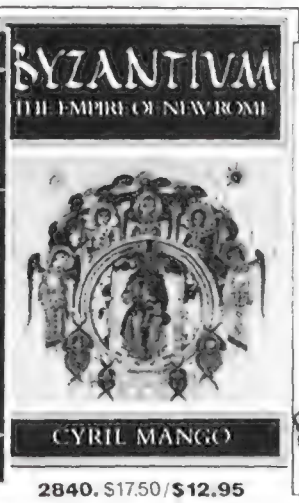

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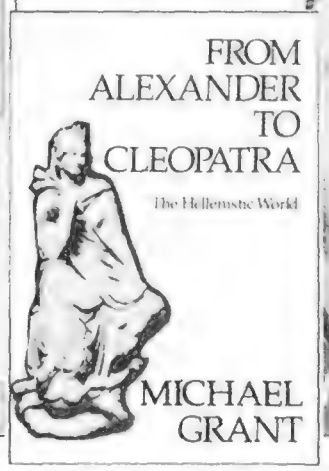

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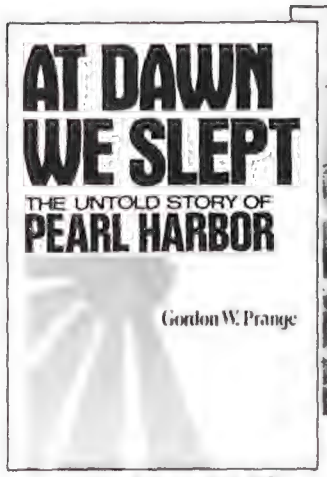

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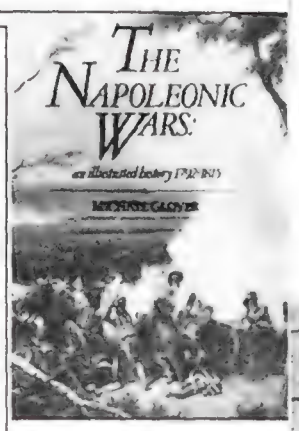

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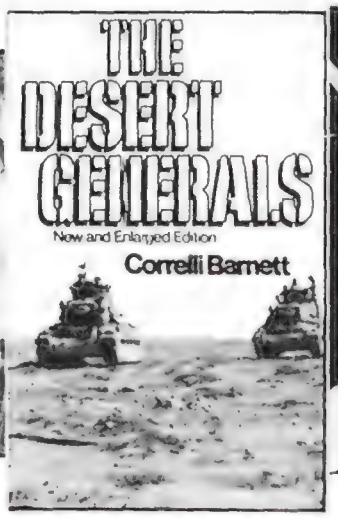

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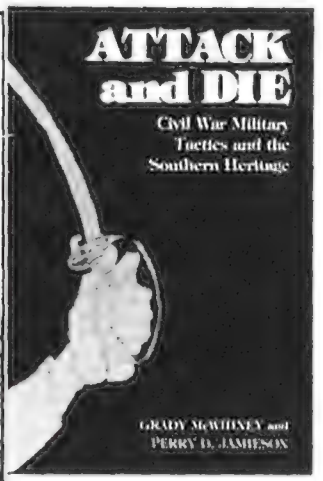

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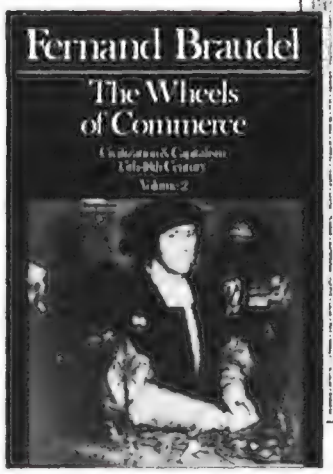

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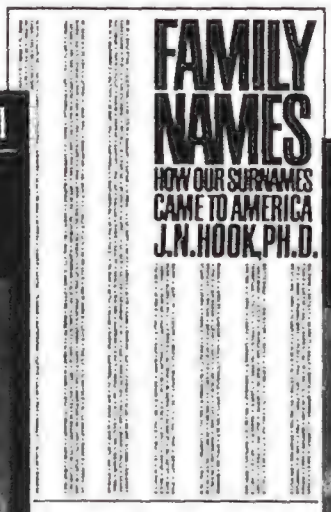

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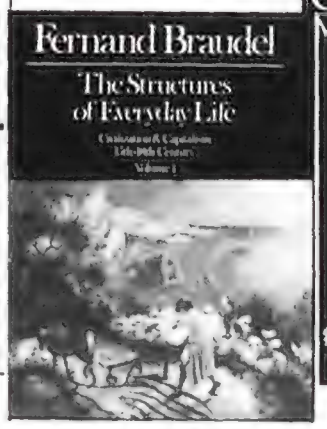

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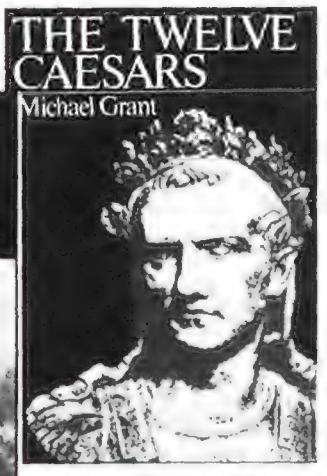

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By Janet Hopson

The freeze-drying technique makes for movable feasts

Known as "sublimation" to the physicists, vaporization of solids is being applied to preserving foods, blood, whole animals

Even in the dead of Missouri winter, if the day was sunny my grandmother would stand on the back porch, pin socks and shirts to a clothesline looped around a pulley, and haul them out over the snow, piece by piece. The wet clothes froze solid and blew in the wind like cardboard, but when Grandma reeled them back in, they were always dry. As a child, this disappearing act—where did the water go?—seemed magical, and today I'm equally intrigued by a technology based on the same "magic"—freeze-drying. Its scope is far greater than Grandpa's shirts: freeze-dried turkey Tetrazzini and human blood substitute, crocodile heads and largemouth bass. With its range of products both peculiar and practical, freeze-drying still seems magical—a tool that confers almost everlasting shelf life on biological tissue.

The story of freeze-drying starts with "sublimation," a spiderish word that crawls out from the pages of old physics textbooks and quickly wraps the curious trespasser in strands of jargon such as "heat of vaporization" and "mass transfer." The concept itself, however, simply means that under certain temperatures and pressures, a solid hunk of something can change directly to the gaseous state without first melting into a liquid and coming to a boil. Sublimation is the reason mothballs dwindle away to nothing as they protect clothes in your closet. Sublimation can create Dr. Jekyll's potion or the atmosphere of a London dockyard onstage as dry ice turns directly to clouds of CO_2 gas. And sublimation of solid water dried my Grandma's laundry in winter.

On the surface of, say, a mothball, molecules jostle about and occasionally move fast enough to launch themselves into the air like pop-fly balls. Gravitational attraction of the mass will bring some of the molecules slamming back to the surface, and others will strike oxygen or nitrogen molecules in the air and thus also be deflected back to the solid lump. Often, however, a vibrating mothball molecule becomes fully airborne, and sails off like a home run. These "home runs" give the closet its moth-repellent odor. Each time a molecule successfully evaporates, the lump grows a tiny bit smaller, until finally it disappears. The same sequence of events takes place on the surfaces of dry ice and the frozen water interspersed in the threads of a cotton shirt on a winter wash line.

People in cold climates were taking advantage of this "disappearing" principle long before they could explain it. Eskimos traditionally suspended ducks, fish or hunks of meat on poles outside their igloos. The howling Arctic winds would quickly freeze the food, and then dry the outer layers—classic freeze-burn. But the food would last for months and the dry parts could be rehydrated easily. Quechua Indians in the high Andes laid out potatoes to freeze and then dry in the sun. Nature, of course, had a line on sublimation long before there were Native Alaskans or Quechua Indians: it is a basic way that solids were created during the formation of the Universe, and it happens as readily in the glowing tail of a comet circling the sun as it does in meat or mothballs.

Molecules are trapped on a "cold finger"

Nineteenth-century scientists studying sublimation designed and used the earliest freeze-drying chambers. These chambers were little more than bell jars connected with a vacuum pump that removed "home run" molecules from the chamber. These early freeze-dryers worked well but were abominably slow. Later ones used a source of heat and a "cold finger."

A great deal of heat is required to freeze-dry a specimen. The heat source provides the difference in energy between the water molecule fixed in an ice crystal and one ricocheting among others in a vapor. The "cold finger" is a long thin trap that works like a condenser coil to gather up escaping molecules after they fly off the surface of the solid. A gram of water is less than a teaspoonful but, as water vapor in a vacuum, it would occupy as much as 10,000 liters. This vapor must be

A backpackers' banquet includes freeze-dried shrimp cocktail, chicken fricassee, rice, strawberries, coffee.

Photographs by Brian R. Wolff

Dr. Ross Tye's membrane filter yields free hemoglobin for a "synthetic blood" that can be freeze-dried.

removed or it slows down the freeze-drying process. So the added cold finger condenses the sublimed vapor into tiny, frozen crystals and collects them on its outer surface.

Modern industrial freeze-dryers are usually high-tech chambers of stainless steel with thick round doors and lots of dials and gauges. Nevertheless, they work just like the original bell jars—by drawing off and collecting gas from frozen objects.

Once the scientists had these chambers, they started freeze-drying all manner of things—including living things. They found that bacteria, viruses, yeasts, protozoa, algae and other microscopic organisms could survive freeze-drying, presumably because they evolved in places that occasionally turned very cold and very dry. Biologists also discovered that many proteins they wanted to study were altered during regular drying, but stayed intact during lyophilization (freeze-drying). When water evaporates from a liquid protein solution, the concentrated proteins may denature and aggregate irreversibly. During freeze-drying, the many ice crystals throughout the frozen solution sublime directly into vapor, leaving a porous structure that rehydrates easily.

The pharmaceutical industry has used the technique to save lives. The first large-scale use came during World War II, when blood plasma—the yellowish fluid that surrounds red blood cells—was freeze-dried. This was sent to field hospitals sealed in packets in which the plasma could be rehydrated with sterile water. Since then, the list has lengthened steadily to include medicinals that cannot be stored in the liquid or frozen state: vaccines against rabies, measles, mumps, rubella; penicillin and other antibiotics; antivenin to treat snakebite; human-skin cells to spread over burns; and many important cancer drugs such as cisplatin and doxorubicin.

Perhaps the most important single life-sustaining substance in the physician's arsenal is blood. And a freeze-dried version is now being tested that could ultimately make medical history. For decades, blood banks were tyrannized by a simple law: whole blood stayed fresh for only three weeks. The shelf life can now be extended to six weeks with certain additives; even so, about 600,000 units of the blood collected annually become outdated.

The delicate commodity in human blood is the red cell, a tiny plump envelope that encloses a million or more molecules of hemoglobin, an oxygen-carrying protein. While the yellowish plasma surrounding the red cells can be freeze-dried, the cells themselves rupture during the initial freezing. As a cell suspension freezes, ice forms outside the cells, leading to dehydration and shrinkage that injures the cell membranes. On thawing, hemoglobin escapes from the cells.

In 1949, British scientists discovered that glycerol, a natural antifreeze in certain insects, could protect living sperm cells during freezing. Later, the technique was successfully applied to red blood cells, although drying these delicate cells is still impossible. Now, rare blood types and emergency stocks can be frozen for decades, as long as the blood is continually kept below −80 degrees C and then carefully purged of glycerol by a series of sterile washings.

Unfortunately, says Maj. Ross Tye, a blood researcher for the U.S. Army, the need for special han-

Chunks of freeze-dried hemoglobin make emergency blood substitute when dissolved in saline solution.

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dling means that frozen blood cannot be widely used. The tyranny of the shelf life continues. The problems of preserving blood, says Tye (p. 92), leave 90 percent of the world's population with no access to the precious fluid during emergencies. In wartime, bleeding soldiers are usually transfused with saline (salt water) instead of whole blood until they reach the hospital, with its carefully maintained blood bank. If the wound is small or moderate, the soldier usually survives with just the saline to keep up his blood volume and pressure. But if the blood loss is severe, the tissues become deprived of oxygen. Since saline itself cannot deliver this life-sustaining element, death often results.

Tye, a 40-year-old physician with an earnest manner, heads a team on hemoglobin modification at Letterman Army Institute of Research, a mazelike concrete laboratory that sits just a mile from the Golden Gate Bridge in San Francisco. Tye's team is developing a freeze-dried blood substitute that could be mixed with saline and used both on the battlefield and during civilian emergencies.

Most of the problems of blood preservation stem from the plump little "wrapper" on the red blood cell. So Tye's group takes outdated and discarded human blood, removes the blood-cell membranes, and works directly on the hemoglobin molecules that actually transport the oxygen. Normally, when hemoglobin circulates in the bloodstream outside of its cellular packet, the molecules break in two and are quickly flushed out of the body, Tye said. He figured out how to fortify the naked molecules chemically so they keep their shape for a day or so, deliver oxygen efficiently, and yet are not toxic. Best of all, the "synthetic blood" is universal—it has no blood types—and since it lacks delicate cell membranes, it can be freeze-dried. In this form (p. 92), the lifesaving hemoglobin can be sealed in plastic IV bags, stored on a shelf and quickly rehydrated with saline.

Trays of frozen cooked beef stew are wheeled out of deep freeze, then dehydrated inside vacuum chamber.

The blood substitute works well in lab animals, and experiments on human volunteers could begin in the next few years. If the testing proceeds without a hitch, synthetic human blood could be available in this decade. With a two-year shelf life, an emergency blood product like this in field hospitals, ambulances, ships, planes and rural clinics would save countless human lives. However, it will not substitute for red cells in 99 percent of transfusions, so the need for blood donations will be unaffected.

Seven-year-old beef stew?

The idea of packaged hemoglobin chunks would probably strike us as preposterous if it were not for the food revolution that followed World War II, making perishability as old-fashioned as iceboxes and radio tubes. Expectations have changed along with the technology: today, we pick up a box of crackers and read, "Best if used before December 1984." Crackers that stay fresh for a year and a half? Why not?

Freeze-dried foods are a familiar part of that war on perishability. Somewhere around the fishing lures and floating flashlights in most sporting-goods stores, you will probably find a rack of "recreational foods"—everything from basics like scrambled eggs, green beans and corn to shrimp cocktail, rib-eye steaks, turkey Tetrazzini and chocolate ice cream. All are sealed in special pouches, packed in nitrogen gas, and waiting to be carried to the top of a mountain or the middle of a lake. And they taste predictably good, especially if you've climbed the peak or rowed across the lake. In late afternoon, still a two-mile hike from the lovely campsite by the stream, nothing motivates one more than the thought of those aluminum pouches. Beef stew that stays fresh for seven years? When's dinner?

Compared to the quantity of food that is annually frozen, canned or packaged with preservatives, very little is freeze-dried—less than one percent of the total. The largest producer in the world is Oregon Freeze Dry Foods Inc., housed in two compounds of industrial buildings in the Willamette Valley town of Albany, Oregon. It was founded by Ellis Byer, now chairman of the board.

When I visited the factory, Byer explained that thousands of pounds of meats, fruits and vegetables arrive at Oregon Freeze Dry Foods each month, most of it already frozen. Some of these comestibles are

The modern cornucopia illustrated here is a display of shrimp, peas, carrots and diced chicken, spilling out of can in freeze-dried condition, and appearing rehydrated in foreground of this high-tech still life.

made into casseroles in 200-gallon bowls; others are cooked plain or prepared raw. The foods are then spread in thin layers on big flat trays, loaded onto large carts with narrow shelves and frozen solid (opposite). The carts are then rolled into huge cylindrical freeze-dryers. An almost perfect vacuum is created inside each machine. The ice inside the food slowly sublimes, as in Grandpa's frozen shirts. The home-run molecules of water vapor collect steadily on condenser plates (large cold fingers), and 12 to 16 hours later, the food is freeze-dried. It is packed into pouches, surrounded by harmless nitrogen gas to prevent oxidation, and sealed. The food usually contains no preservatives, but it can be stored "virtually indefinitely."

Freeze-drying is surely not magic to Byer, a trained engineer and pioneer in the field, but he still seems to relish the arcane details: water accounts for 93 percent of the weight of green beans and mushrooms, for example, so that 14 pounds will reduce to one pound freeze-dried. Peas are only 80 percent water; five pounds reduce to one pound. Compressed into flat "hockey pucks" and stacked in cans, an enormous number of peas will fit into a small place like the galley of a submarine. A drug company once went so far as to have watermelon freeze-dried into powder for use as a food supplement. In general, however, foods that are almost all water, like lettuce, shrink into papyruslike fragments and rehydrate into little puddles. Freeze-dried corned beef on rye is unlikely—too soggy.

Freeze-dried goods have been carried to some out-of-the-way places, like the top of Mt. Everest and the surface of the moon. But hikers, climbers and astronauts are a small market compared to industrial customers. Dehydrated soups and meals manufactured by the Lipton Company, for example, utilize freeze-dried

Janet Hopson is a frequent contributor whose last article was on wind farms, in the November 1982 issue.

chicken and vegetables. The second largest market is the Armed Forces. Marines landing in South Vietnam carried Long Range Patrol Rations, some packed by Oregon Freeze Dry Foods. And mess halls around the world serve to U.S. soldiers freeze-dried items such as Jumbo Gulf Shrimp and regulation-size beef patties, 4½-by-2-by-½ inches. However, the most successful application of freeze-dried foods is freeze-dried coffee.

The biggest market, as yet untapped, would be the supermarket, and Oregon Freeze Dry Foods appears to have in mind a secret project to freeze-dry *something* for the mass consumer. Conventionally dried foods are, of course, a human mainstay, and have been since hunter-gatherers first dried meat and berries and pounded them into pemmican. But if one could watch a time-lapse movie of, say, a berry drying in the sun, the fruit would appear to shrivel as the liquid water escaped as steam. This evaporation, explains Ellis Byer, "strips" flavor molecules from the food during regular drying. That's why hot-air dried coffee crystals, for example, taste different from freeze-dried ones.

For me, the wonderment that started with Grandma's laundry reaches its zenith not with freeze-dried mushrooms and strawberries but with freeze-dried sea otters and crocodile heads. About 25 years ago, taxidermists discovered that they could not only cut their labor by about 80 percent, but also produce more lifelike specimens by simply freeze-drying whole animals instead of skinning and stuffing them. This technique was developed by Dr. Harold T. Meryman, a biophysicist at the Naval Medical Research Institute in Bethesda, Maryland. The animal is frozen solid in a natural position—pouncing upon prey, for instance. Then it is secured with wires inside a large freeze-drying chamber. There, depending upon size, it will sit for a few weeks to more than a year, as the ice inside billions of individual cells slowly sublimes to vapor and works its way to the body surface, to be drawn off by the vacuum. Since the internal organs are left in place, the specimen keeps its shape and correct dimensions. It simply turns to the weight and consistency of balsa wood. After the freeze-dry taxidermist adds a few artistic touches—artificial eyes and some oil-based paint to the faded skin—the specimen can sit in a museum display or hang over someone's fireplace unchanged for several decades.

The first to introduce Meryman's freeze-drying to museum exhibits was Dr. Rolland Hower, director of the Freeze-Dry Laboratory at the Smithsonian's Museum of Natural History. Hower has been freeze-drying specimens (opposite) since 1957, and his list includes fish, frogs, salamanders, lizards, snakes, spiders, insects, birds of all sorts, and most kinds of small mammals (SMITHSONIAN, May 1971). His lab's biggest project was a 65-pound crocodile head, jaws agape, that lost 30 pounds of water after 13 months in the freeze-dryer.

A colleague of Hower's in the early 1960s, Richard Gurnee of Watsonville, California, freeze-dries specimens for several West Coast museums, sport hunters and fishermen. His biggest projects have been a 65-pound sea otter and a standing coyote, but he has also preserved diminutive chameleons, field mushrooms and garden snails. By now, according to Gurnee, about one-third of U.S. museums have freeze-dryers. Conventional taxidermy, however, will probably never be replaced entirely because the freeze-drying of large animals is too expensive.

There is something quite remarkable about a freeze-dried roadrunner, poised forever in midstride, or a largemouth bass, light as Styrofoam above the mantelpiece, forever swallowing a fly. This preservation of fleeting biological behavior lends a quality to life that is lacking in nature: a permanence, not just by means of reproduction, but by sublimation, a process far older than any species, including the one that builds freeze-dryers. Preserving the oxygen-carrying capacity of hemoglobin, or the food value of peas, is perhaps more useful to our species than simply conserving the educational potential of a sea otter that washed up on the beach. But locking an instant of an animal's behavior into the solid matrix of its own freeze-dried tissue seems something akin to the way a favorite image—like Grandma hanging out her laundry in winter—becomes locked in the memory. While both may be explained in physical terms, they nonetheless retain a magical quality that, for me at least, can never lose its wonder.

Surrounded by specimens, Dr. Rolland Hower holds preserved copperhead in Smithsonian freeze-dryer.

By Dick Houston

An old Africa hand fights to keep his lions wild and free

At 78, George Adamson of Born Free *fame is defying poachers and poverty to continue his work in Kenya's Kora National Reserve*

On a hot afternoon not long ago, I found myself lurching across the rugged plains of northeastern Kenya in a dilapidated Land Rover that felt as if it had square tires. Bracing myself against one stiff jolt after another, I watched as my white-haired companion peered intently through the dusty windshield and wrestled with the wheel. We were heading for his wilderness camp near the southern banks of the Tana River and daylight was fading fast.

Suddenly, a warthog darted in front of us with a large lioness in hot pursuit. Swerving, we stopped and watched as the cat pounced in an explosion of dust and then, with a thunderous roar, carried off her kicking, squealing prey. My driver calmly broke out his pipe and lit up. "Glad to see that Koretta can take care of herself," he reflected, adding, "and glad, too, that the bloody poachers haven't gotten her."

Koretta is one of 40 captive lions that have been released back into the Kenyan wilds during the past 25 years by an ex-game warden named George Adamson. The man sitting next to me happened to be none other than Adamson himself. At 78, he is, like Koretta, a survivor—one of the last living links to the bygone days of British Colonial rule, when a flamboyant coterie of white hunters, game wardens and assorted other "bush

From rocky vantage point, ex-game warden Adamson looks for cats while out in the bush on lone patrol.

From a similar viewing spot, Naja, one of Adamson's recycled lionesses, watches for prey with her two grown cubs. The black, cylindrical object that appears to be under Naja is one of Adamson's little-used rain gauges.

rats" exercised what amounted to a virtual monopoly over East Africa's spectacular wildlife. But although he was very much a part of the exciting safari scene celebrated by Ernest Hemingway, Robert Ruark and other writers, Adamson's job was anything but glamorous. He was required, as a warden, to dispatch numerous man-eating lions and rogue elephants. He was also required to kill many other creatures that were guilty only of being in the wrong place at the wrong time. He did it because it was his duty, but it bothered him.

Then Adamson's life took a dramatic turn when he found himself playing a lead role in an improbable man-saves-lion situation. Eventually, his wife, Joy, wrote a book about the experience and it became one of the most beloved animal stories of our time. Called *Born Free*, the 1960 best-seller (and a subsequent film version) made Adamson into a reluctant international celebrity for a while. More important, as far as he was concerned, it made it possible for him to concentrate on saving lions rather than shooting them.

Today, at an age when most people have long since opted for retirement, Adamson is still working hard at his Kampi Ya Simba (Camp of the Lion) in the Kora National Reserve (p. 104), an isolated sanctuary located some 230 miles from the air-conditioned comforts of Nairobi. He persuaded the Kenyan government to set aside the 500-square-mile tract ten years ago as, in effect, a school for the nation's children and an ecological laboratory for scientists from all over the world. Ever since the reserve's boundaries were established, however, Adamson has been waging a constant battle against poachers in an effort to keep Kora's beleaguered wildlife alive.

There is something both inspiring and disquieting about the old man's current predicament. Adamson has been mauled several times by his cats and his stamina is not what it used to be. His eyesight is bad and he is broke. Three years ago he suffered a severe personal setback when Joy, from whom he had been separated since the mid-1960s, was murdered by an angry employee. Now, his own life is in danger and he sleeps with a loaded revolver at his side. Notwithstanding these and other troubles, Adamson is determined to stay put. "The best hope for Africa's wildlife lies with places like Kora," he said. "It is too remote for tourism and the area is too poor for farming because of droughts. It has a wonderful variety of bush and river animals, and its primitive condition makes it ideal for research. But if I don't get some help out here

Frequent freeloaders, a yellow-billed hornbill and a ground squirrel share lunch at Adamson's base camp.

soon, there may not be many animals left to study."

Fifteen years ago, in his autobiography, *Bwana Game,* Adamson vividly recalled the beginnings of his conversion to the lions' cause. He was out on patrol when he came upon a lioness reclining on a rock. "I wondered how many lions had lain on the self-same rock during countless centuries while the human race was still in its cradle," he wrote. "It was a thought which made me reflect that though civilised man has spent untold treasure on preserving ancient buildings and works of art . . . yet he destroys these marvelous creatures which typify the perfection of ageless beauty and grace."

Adamson loves the lions' country, too, and it is easy to see why. Shortly after our encounter with Koretta, the Land Rover surmounted a gigantic rock outcropping and there, stretched out before us, was an endless vista of what Hemingway called "a million miles of bloody Africa." Budding acacia and Commiphora trees swept across the landscape like an emerald sea. Nearby, an elephant trumpeted and, for a moment, it was possible to believe we were in an African paradise.

Adamson and Elsa, heroine of *Born Free,* sat for a family portrait a few years before Elsa died in 1961.

That illusion was rudely shattered, however, when we arrived at our destination. Looking over Adamson's desolate compound, I wondered what guardian angel allowed this threadbare operation to survive. A flimsy 12-foot-high wire fence encompassed an acre or so of dusty ground containing eight palm-thatched huts, a vehicle-repair shop and two wheelless Land Rovers on blocks. A small enclosure with a water-filled bag constituted the camp's solar-heated shower.

Adamson led me into his dining area and I was nearly blown over by several dozen flying birds of various sizes and shapes. Ground squirrels chased lizards over my feet. "Watch out for Guilfy!" Adamson warned. "She goes for your toes." Guilfy is a hissing, four-foot-long monitor lizard; I was wearing sandals.

Surrounded by his colorful menagerie (above), my deeply tanned host—wearing only a pair of baggy walking shorts—looked like an aging actor on the set of an old Tarzan movie. He offered me a tot of gin and we moved outside to enjoy our sundowner, as the cocktail hour was called in safari days. Soon, Adamson announced that it was time for the light-up—and pumped a kerosene lamp into a leaping flame. The stars were just beginning to perforate the black sky when I saw

a half-dozen large figures with glowing eyes slink through the shadows outside the compound.

"It's Koretta and Naja with their cubs," George muttered, rising to fetch a pan full of goat meat. He startled me by opening the gate and stepping outside to toss the raw chunks into the air. Instantly, the lions leaped forward and snatched the morsels as deftly as a house cat ensnares a bird. When the meat was gone, Adamson closed the gate and sauntered back as casually as a farm boy returning from his chores.

In the jaws of a feline dilemma

Not all of Adamson's encounters with his liberated lions have been so uneventful. Several years ago, he was out on patrol when he met up with two of his ex-charges, a male named Suleiman and his sister, Sheba. They playfully bounded straight at Adamson. Suleiman grabbed him from behind and the two of them crashed to the ground. When Adamson squeezed off a warning shot with his pistol, the animal—no longer playful—growled and bit deeply into his neck. Adamson then jammed the weapon into a fleshy area above the lion's shoulder and fired. With that, the lion retreated and Adamson hobbled off, bleeding profusely. He made it back to camp where doctors in Nairobi were radioed to fly up and repair the damage. "I worried all night about Suleiman," he recalled sheepishly. "I was relieved the next morning when he showed up looking little the worse for wear except for a bullet lodged under his skin."

In his youth, Adamson seemed destined for a tamer life. Born in India of an Irish father and an English mother, he was 18 when he came to Kenya with his parents to help set up a coffee plantation in the highlands. Stifled by that dull existence, he and his younger brother, Terence, were lured to the vast spaces of the bush. There, Adamson tried his hand as gold prospector, miner, beeswax dealer and locust-control officer until he found his true vocation as a game warden. Some years later, he met a young married couple, Peter and Joy Bally, who were on a plant-collecting and painting safari. Joy, a strikingly handsome artist from Austria, took an instant liking to the shy young warden. The feeling was mutual and in 1944, after her divorce, Adamson and Joy were married.

The Adamsons lived outside of Isiolo, then a small village situated 3,000 feet above the arid plains of the Northern Frontier District. George spent much of his time on long safaris, chasing poachers or hunting down troublesome creatures, and Joy often accompanied him. In 1956, he returned from a lone patrol with an orphaned female lion cub, which the Adamsons promptly adopted and named Elsa. When the cuddly little creature grew into a 300-pound lioness, the couple made a fateful decision not to turn her over to a zoo. Instead, they resolved to teach Elsa how to live on her own in the bush.

The idea was controversial because it had seldom, if ever, been tried before. Animal experts scoffed when they heard about it. Once tamed, they said, no lion would ever be able to hunt, mate and rear cubs. But the Adamsons proved the experts wrong. Not only did Elsa succeed in fending for herself; she also kept in touch with her human "parents" long after she had left home. When Joy chronicled the remarkable episode, basing her treatment in part on George's diaries, *Born Free* became an instant hit all over the world. Its success inspired two book sequels (*Living Free* and *Forever Free*) and two popular motion pictures which captured perfectly the enchantment of life in the bush.

Perhaps that life was never quite as romantic as the movies made it appear, but Kenya unquestionably was much wilder when it gained its independence from Great Britain 20 years ago than it is now. This rapidly growing nation of some 18 million currently has one of the highest population growth rates in the world. The demands of its farmers, herders and woodsmen for more land and timber are creating serious habitat problems for the country's cats, elephants, gazelles, zebras and antelope. Kenya has developed a superb system of national parks and reserves, but these units can scarcely begin to compensate for the alarming loss of habitat elsewhere.

And then there is poaching. Fueled by a booming international trade in ivory, skins and other wildlife products, poaching remains a serious problem in

Adamson feeds lions goat meat only when wild prey is scarce; here, animals scramble for the lion's share.

Tony Fitzjohn, Adamson's assistant, prepares to weigh a leopard cub before its daily walk into the bush.

much of Africa today. In the past decade, 50,000 to 100,000 elephants have been slaughtered every year. Leopards, according to current U.S. Government regulations, are now considered a threatened species in sub-Saharan Africa and listed as endangered elsewhere. In Kenya, the government has declared an all-out war against poachers, but funding problems seriously hamper the effort. The raiders still enjoy virtually a free hand in the more isolated reaches of the country, and their impact on rhinoceroses, leopards and other creatures is awesome. Lions remain relatively numerous, but they have been eliminated by herders in parts of the north; in the south, much of their wild land has been nibbled away.

In Kora, the last leopard and the last rhinoceros were killed off by poachers seven years ago. Giraffes and lions are under terrific pressure and poachers enter the reserve from neighboring Somalia to machine-gun elephants, having already decimated the species in their own country. The Kenyan government provides occasional assistance, but for the most part Adamson, his helpers and his young assistant, Tony Fitzjohn (left), are on their own.

A typical day for Adamson is taken up mainly with antipoaching patrols, starting at 7 A.M. It is dangerous work—all the more so because he is a marked man. Recently, a German tourist and two Kenyan officials were ambushed and killed near the Kora border, presumably by Somalis living in Kenya. Not long ago, Adamson said, he and Fitzjohn may have narrowly avoided a similar fate when one of their drivers heard about a plot to ambush their camp.

At stake in the struggle for control of the reserve is the capstone of Adamson's career: his rehabilitated lions and their offspring. Considering the fact that only peregrine falcons and a few other predatory species have been successfully reintroduced into the wild elsewhere, Adamson's success appears to be a remarkable achievement. Many scientists downplay it, however, contending that, in the larger scheme of things, such a limited project is of limited worth. They also voice concern about the practicality of introducing new animals into an area that is already occupied by an existing population of highly territorial beasts.

Conservationists generally recognize four basic strategies for reestablishing wildlife populations in a given area. Rehabilitating creatures raised in captivity is usually advocated as an option of the last resort for endangered species only. The other three strategies involve protecting resident species so they can rebuild their own numbers, encouraging immigration from adjacent areas, and transplanting animals from more distant areas where they are abundant.

Adamson maintains that using rehabilitated lions to seed a new population in a vast region where poachers have decimated the previous inhabitants can hardly be written off as insignificant. He concedes that territoriality was a problem for some of his lions at first, and while he observed some terrible battles, most of his animals held their own. Eventually, the new cats were assimilated by the existing population and some of the introduced animals even mated with the resident lions. About half of Adamson's 40 animals still survive; the others died of disease, old age or poaching, or simply wandered off the reserve. One encouraging sign is the breeding success of the rehabilitated cats:

Ohio-based writer and photographer Dick Houston has operated tourist safaris in Africa. He is now writing a book about the filming of movies there.

WINE & FOOD

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With one of his Kenyan helpers, Adamson inspects remains of a giraffe killed by poachers near the camp.

they have managed to produce more than 100 cubs.

Adamson obtained his cats from various donors: the movie company that made *Born Free,* the Nairobi Animal Orphanage, zoos, game wardens and friends. The process of weaning them individually into the bush was difficult and tedious. It began with long walks out of the compound into the adjacent countryside. At first, many of the lions bolted back, but eventually they became increasingly secure in their new surroundings. At some point, each animal began to stalk smaller game. Adamson discovered that even the zoo-bred animals, several generations removed from the wild, had not lost their hunting instinct. From their first clumsy killings, the lions moved up to larger prey. As they grew ever stronger and more cunning, they stayed out in the bush for longer periods. As the lionesses matured, they set up their own territories, mated and raised their litters. With that, they were basically on their own.

Recently, Adamson's age and a serious cash-flow problem prompted him to declare his lion-restocking program at an end, which is one reason why he is so keen on protecting the animals from poachers. He will not be introducing any more of them. But his colleague, Tony Fitzjohn, has begun a similar project with leopards under Adamson's watchful eye. Fitzjohn's separate camp resembles a miniature version of Adamson's. Tall and muscular, the 38-year-old apprentice arrived on the scene a dozen years ago after drifting around the world doing odd jobs. He found his calling at Kora when he offered his considerable mechanical skills to Adamson and shortly discovered that he possessed an unusual rapport with cats. Like his mentor, he has been badly mauled and he, too, is determined to succeed with his program.

Presently, there are only two 26-month-old leopards in Fitzjohn's compound, a brother and sister. They were donated by a nightclub owner in Paris. Fitzjohn has great affection for them, but neither he nor Adamson has ever tried to make pets of their animals. "If we can successfully release these two," Fitzjohn said, "a zoo in England may begin breeding leopards especially for us to restock here."

The main obstacle to the achievement of that goal is a severe shortage of funds. When Joy Adamson died in 1980, her husband received only a small annual subsistence sum; years ago, he had been denied any of the considerable royalties from *Born Free,* although it had been based on some of his diaries, and he had helped with the editing. Caught up in the success of her books and the obligations of celebrity, Joy Adamson had begun leading a new and busy life. She became involved in her own research with cheetahs, set up her own base camp and poured most of her money into that. The two drifted further and further apart, all the while remaining on friendly terms. "The stories that Joy and I had completely abandoned each other were just rubbish," George said. "I think in the back of our minds we still hoped to get back together one day when we were too old to continue with our projects." Be that as it may, the upshot of their estrangement is that Adamson is supporting himself and his work mainly on his meager warden's pension.

Adamson and Fitzjohn operate under conditions that many others might find intolerable. They subsist on tinned food and make do without fresh vegetables.

Surrounded by scrub, Kampi Ya Simba (Camp of the Lion) is 95 miles from a town, five miles from water.

Reach out and touch someone.

Bell System

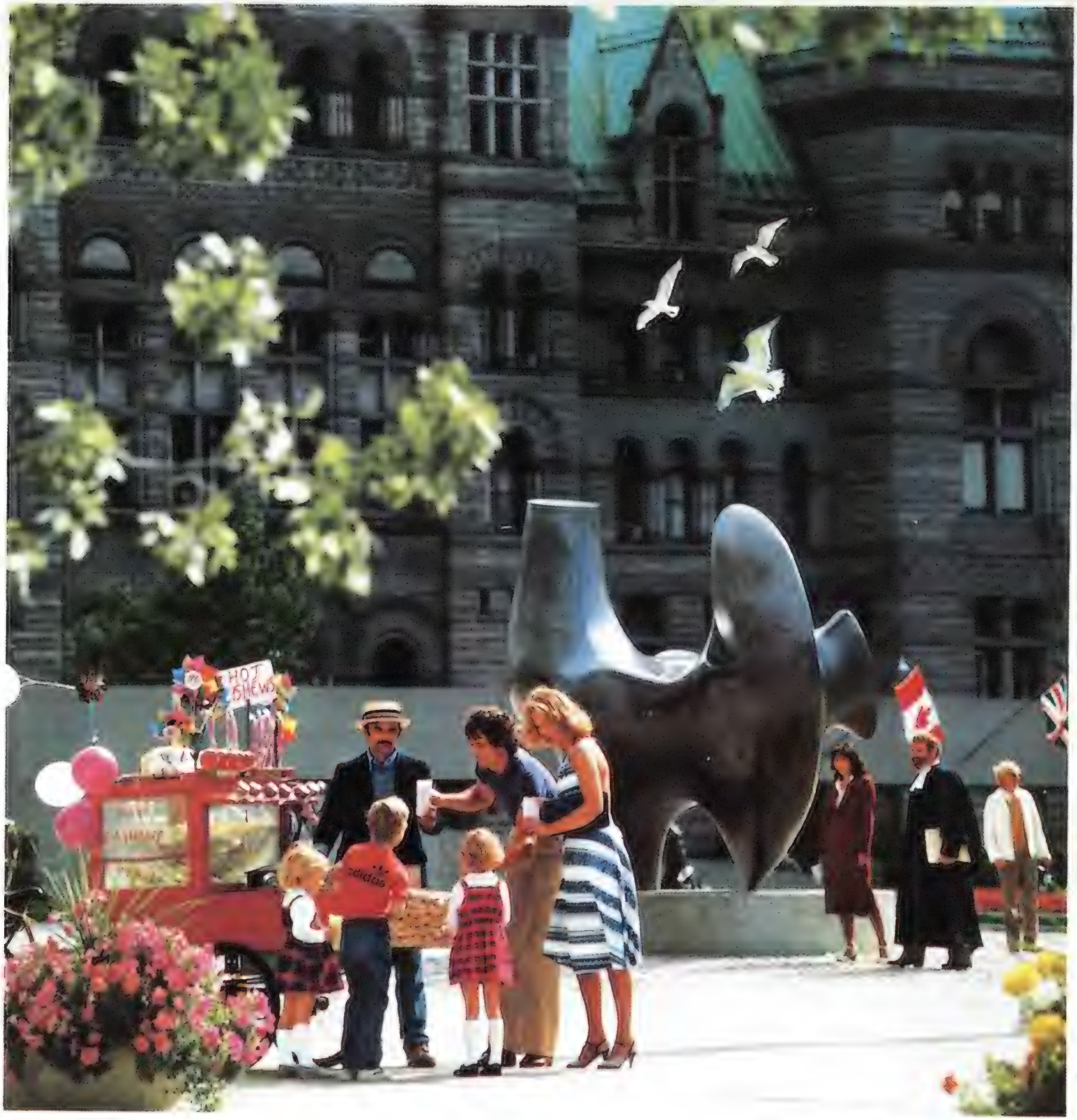
There is no money to buy spare parts, new tires or batteries for their battered vehicles. There is little apparatus for research work other than two recently acquired radio collars and a telemetry receiver for keeping track of the leopards. Their only connection to the outside world is their radio, and the nearest village for supplies is 95 miles away.

Such hardships have not dampened Adamson's enthusiasm or soured his dreams for Kora. "We want to see Kora thriving again," he said. "By restocking it with lions and other species, we can turn it into a wilderness-type reserve without the usual mishmash of luxury lodges, swimming pools and tourist buses. We can build camping sites where people will sleep out under the stars, take small-boat trips down the river to see hippos and crocs, and go out on foot safaris with rangers to learn about ecosystems." Adamson still looks forward to the time when an improved road might enable schoolchildren to visit Kora and appreciate their natural heritage. "And of course they must see my lions," he insisted. "Most African children have never seen one, except in picture books."

The other part of Adamson's dream for Kora is already on its way to becoming a reality. This month a joint expedition of the Royal Geographical Society of London and the National Museums of Kenya, under the guidance of Oxford zoologist Malcolm Coe and Kenyan paleontologist Richard Leakey, will begin an ambitious study at the reserve. Led in the field by Dr. Coe, some 40 biologists, botanists, geologists and other scientists will inventory Kora's wildlife, vegetation and water to find out how these resources interact with each other.

The result of all this activity will be a sophisticated management plan that could ultimately become a blueprint for Kora's survival. Nothing, of course, would please Adamson more. After the fieldwork ends in October, it will take months to write up a report. In the meantime, the old man will be keeping an eye on things. Adamson believes that lions can communicate with Man—can even, in some seemingly telepathic way, anticipate human behavior. If that is so, then the lions of Kora must know by now that their longtime benefactor will be with them for the rest of his days.

Symbols of Kora Reserve's past and future, George Adamson and Tony Fitzjohn converse at end of day. Fitzjohn signed on as mechanic and soon developed rapport with cats. Now he does much of the work.



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WONDER
WHEEL

By Jack Fincher

George Ferris jr. and the great wheel of fortune

All manner of Midway rides still trade on his name, but his first grand design bore him swiftly from fame to disaster

It was a time of celluloid collars and peppermint shirts, of nickel beer, and the free lunch, and of a can-do optimism that shone as bright as the new electric light upon everything from hopes for crime prevention to woman's rights and man's perfection. Above all it was, oh so briefly, a world without war. If civilized countries had not yet beaten their swords into plowshares, they were at least shaping steel and iron into soaring monuments to grace great expositions, although the unquenchable fires of nationalism still drove each to outdo the other.

Which was why the cream of American architects and civil engineers had assembled in Chicago that icy Saturday afternoon in early 1892. They were there to hear a pep talk from Daniel H. Burnham, construction chief for the 1893 World's Columbian Exposition to celebrate the 400th anniversary of America's discovery. Burnham, whose firm's 22-story "Capitol" building, put up in Chicago in 1891-92, was the world's tallest at that time, had just made a discovery himself. In a nationwide contest to decide what Yankee know-how should build to beat the Eiffel tower, star of the 1889 Paris Exposition, the best idea that the engineering brains of the country could come up with was another tower yet taller.

First Ferris wheel, 264 feet high, was stately yet spectacular hit of the 1893 Chicago World's Fair.

Fiery "Ferris wheel" on Coney Island today is really based on radically non-Ferris construction and design.

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Only known Ferris portrait is this photograph made to promote wheel.

Chicago had won Congressional approval to serve as host for the first real world's fair to be held in the United States, though the choice occurred only after a bout of intercity boasting so gaseous that journalist Charles A. Dana called the winner "that windy city." That may explain why Burnham began by praising the fair's architects for artistic skill and originality—a dubious assertion, historians agree, but understandable coming from one of their own who had commissioned the Exposition's 200 buildings in a classical theme of "Greco-Roman-Oriental style." (A wit predicted that the esthetic damage likely to be wrought by mediocre emulation would last half a century.)

But while the architects had covered themselves with glory and enduring fame, Burnham went on, not so the nation's engineers. "Mere bigness is not what is wanted," he concluded; "something novel, original, daring and unique must be designed and built if American engineers are to retain their prestige and standing." But what? Nobody answered. Sitting there listening, however, was a tall, slim fellow with a bushy, black mustache and a "pale, resolute face." Stung by Burnham's words, the young man with the piercing eyes secretly vowed to meet the awful Eiffel challenge.

At this point legend takes over. While dining at a local chop house that night, the young man whips out pencil and paper and sketches his inspiration so perfectly that, despite a complexity of stresses and strains, not a single change need ever be made. "I fixed the size, determined the construction, the number of cars we would run, the number of people it would hold, what we would charge," he later told a worshipful reporter.

At 33, engineer George Washington Gale Ferris jr. had done nothing all that novel, original or unique, though his design, sketched on a restaurant table, was soon to prove daring enough. He had, in fact, merely committed the cardinal redundancy of his craft: he had reinvented the wheel. But at least the man had reinvented it *big*.

The eighth child born to a Nevada farmer, George Ferris, we are told, was so turned off by the rigors of formal learning that when he was 16 his frustrated parents exercised the conventional middle-class remedy for a disappointing son: they sent him to military school—in Oakland, California. From there he went East to Rensselaer Polytechnic Institute (RPI), in Troy, New York, where he was elected sophomore class president, sang first tenor, joined a fraternity and the rifle club, and in varsity baseball once demonstrated his ability to rise to a challenge by reportedly nailing a Union College runner at the plate with a 344-foot throw from the outfield.

Graduated in 1881, Ferris embarked upon a career that was solid and enterprising, though not overwhelmingly spectacular. He became a tunnel-and-trestle engineer, bridge

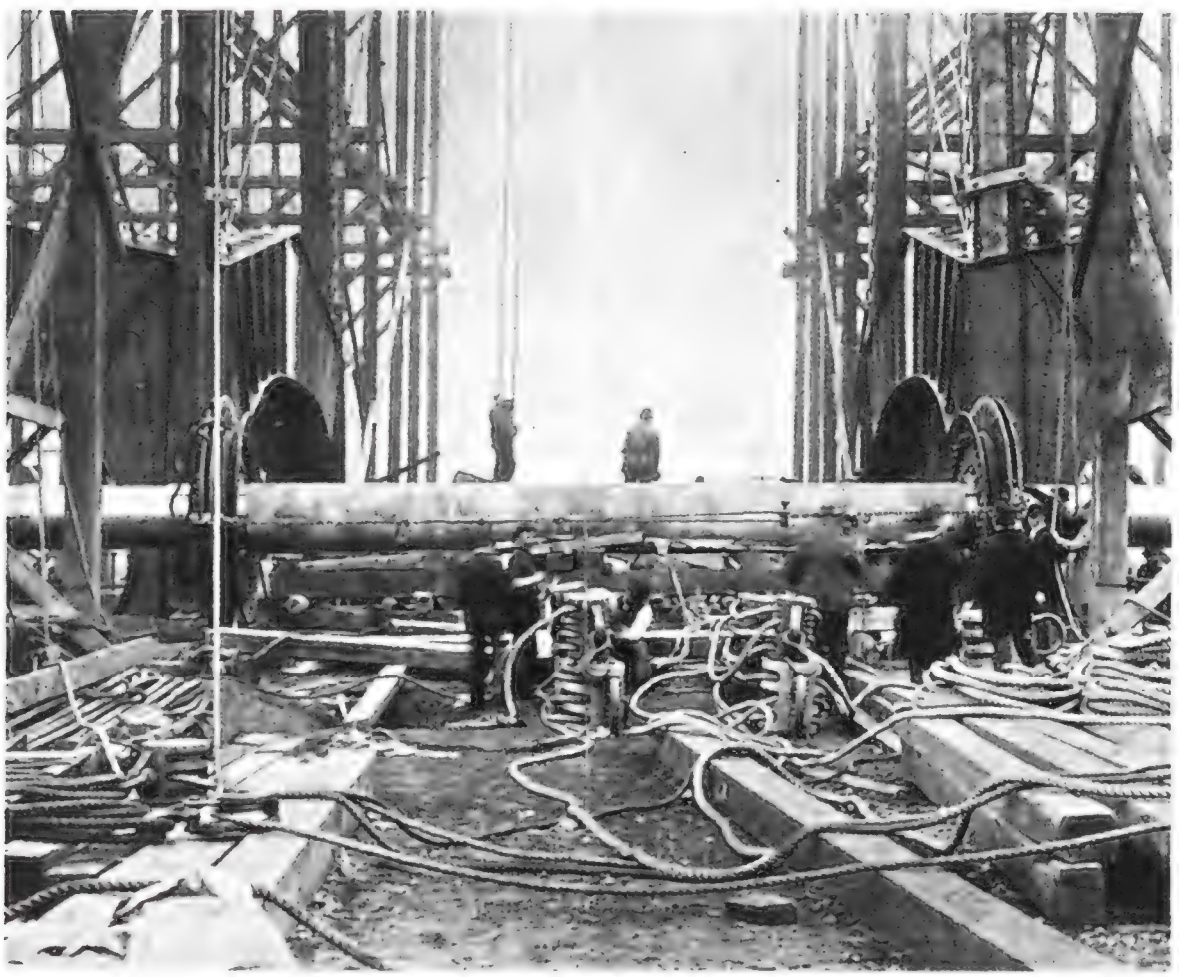
Jack Fincher regularly writes for SMITHSONIAN. *His last story, in July 1982, was on Golden Gate Bridge.*

builder and head of his own company. He also pioneered techniques for forging structural steel.

Legend aside, exactly when, where and how the structural inspiration for his fabulous wheel came to him no one knows exactly. Certainly while growing up in Nevada, Ferris must have seen plenty of water wheels used in irrigation. He would have most likely known the imposing 60-foot specimen at the old Burden Iron works in Troy, near his college, as well as some small amusement-park wheels. But the first person to share his plans in detail was the man on whom most of the nuts-and-bolts work would depend, his partner, RPI engineer William F. Gronau.

"[Mr.] Ferris called me into his office and unfolded his scheme of building a monster steel wheel 250 feet in diameter and to be constructed like a bicycle wheel," Gronau later wrote. From then on, Gronau made plain, the overriding technical problems of safe balance and stressing—both new, even if the concept wasn't—fell to him. "I had no precedent," he wrote. But, he added, "I hit upon a method." And Ferris? "Much credit is due Mr. Ferris . . . for obtaining the concession . . . and successfully managing the financial end of the wheel."

Both were notable accomplishments especially in view of the first reaction by World's Fair officials to Ferris' early drawings of the biggest wheel ever, 26 stories high—four taller than Burnham's "Capitol" building. It would turn on a 70-ton axle 45 feet long, the most enormous hollow steel rod ever forged (below). One 1,000-horsepower engine would drive the wheel through its stately gyrations. Another would be held in reserve against unplanned stops. Should the wheel somehow spin free, a huge air brake could tighten a pair of ten-foot steel bands until not a cog in the mammoth clocklike mechanism could move. Thirty-six cars would carry 60



Ferris' design, in effect a bicycle wheel built to bear 1,200 tons, depended heavily on this huge axle. Weighing 70 tons, and 45 feet long, it was the largest nickel-steel shaft ever forged.

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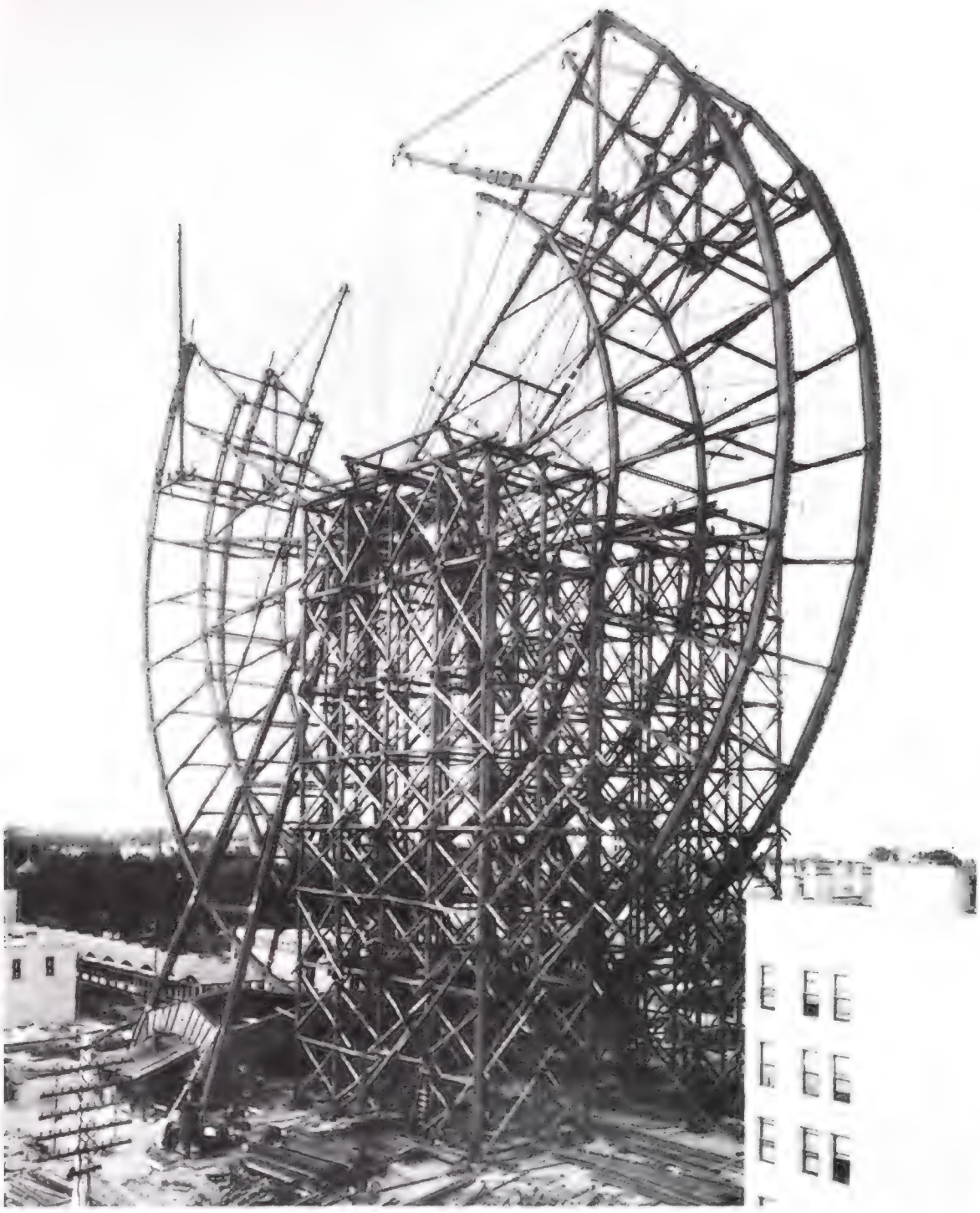

In its first reincarnation the wheel was assembled (1895) on Chicago's North Clark Street, but failed to draw crowds.

passengers each. The whole apparatus would be suspended between 140-foot-high steel towers anchored in 20-foot-square concrete blocks each sunk 35 feet deep in the earth. Fully loaded, the wheel would weigh 1,200 tons, or as much as three Boeing 747s.

Exposition leaders were aghast. Folks hinted that Ferris had wheels in his head. A popular magazine promptly christened the plan "G. W.'s cockeyed dream." Burnham warned Ferris that the engineering was obviously so flimsy the machine would collapse in the Lake Michigan gales, strong enough, it was popularly supposed, to "strip the fur off a buffalo." Even if this did not happen, added Burnham (whose motto, incidentally, was "Make no little plans; they have no magic to stir men's minds"), the public would be afraid to ride the sky in such a rickety-looking contraption.

Ferris persisted; officials waffled. A concession was granted one spring day, then revoked the next. Finally, with 1893 fast bearing down on them and nothing to top Eiffel but another tower, they relented. Ferris could build his wheel—provided he could pay for it. The Exposition's $28 million in construction funds had long since been allocated elsewhere.

Ferris agreed. And fired by his quiet enthusiasm, wealthy businessmen flocked to buy stock, capitalizing eventually almost twice the $350,000 needed. Ferris turned now to the steel industry; a dozen different contracts were let. By year's end the spidery wheel-of-steel-to-be was nothing more than 2,000 tons of raw pig iron scattered around nine Detroit mills. Less than six months later, despite three feet of frost, the foundations had been poured and five freight trains of 30 cars each were snaking across the prairie toward Chicago with thousands of bars, trusses and girders cut to fit like gigantic Tinkertoys.

At this critical juncture, George Ferris may have lost his legendary confidence. Who could blame him? Most of Chicago's first World's Fair was already glittering in place. For some two miles along Lake Michigan it lay like a magic carpet, spread with the mechanized, electrified wonders of the dawning 20th century: the telephone, the phonograph, the incandescent lamp, the Linotype machine. Forty-six nations were on hand with more than 250,000 displays. In keeping with Charles Dana's condescending epithet, 224 congresses on everything from agriculture to monotheism were in blustery progress. Mrs. Potter Palmer, a leading socialite and feminist, gave a ringing speech declaring that women, already liberated, now had time "to pursue careers of their own choosing." Meanwhile, a scant distance off on the Midway Plaisance, from which gaudy carnival midways would forever after get their name, the notorious cooch dancer Little Egypt proved distractingly liberated in the summer heat.

Faced with all this, Ferris may well have wondered how this gargantuan creation could possibly top such a panoply, much less outshine the memory of Alexandre Gustave Eiffel's wrought-iron miracle. There wasn't

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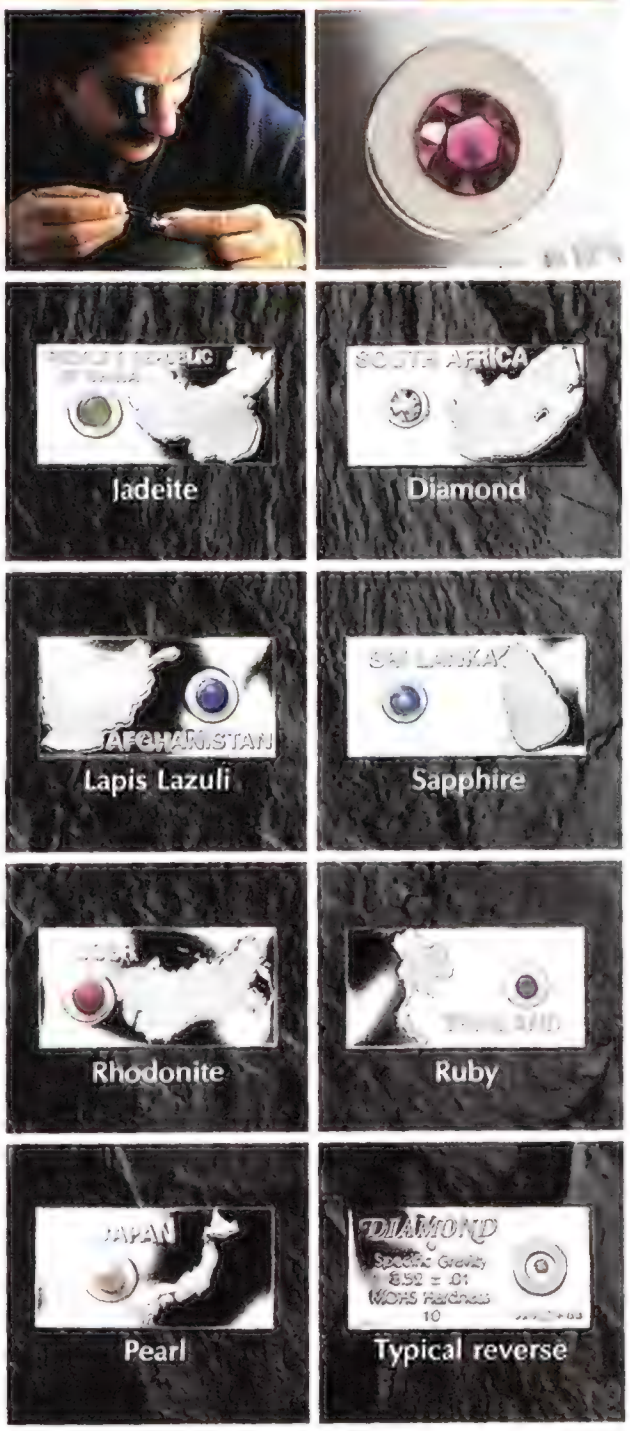

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even time to set the wheel up and test it in private before the myriad pieces shipped to the site had to be assembled like some mad suit cut by a dozen demented tailors. Although its fits and tolerances would be laughable today, errors in measurement, Ferris knew, might soon prove as disastrous for the wheel as others had in early steel bridges that collapsed. When it came to shimmy and shake, the Ferris wheel might even show Little Egypt a seismic trick or two!

If ever there was a time for cold feet, this was it. Summoning Gronau to come and watch, Ferris ordered construction chief Luther V. Rice to "turn the wheel or tear it off at the towers." Then he fled back East on pressing business.

But let Gronau tell it: "Mr. Ferris . . . was in Pittsburgh at the time, and I can distinctly recollect wishing that I were with him. . . . Suddenly I was aroused from these thoughts by a most horrible noise! . . . and found . . . to my intense relief, that [it] was being caused by the scraping off of the rust on the brake band." But not a sound could be heard later when "the wheel turned, amid the cheers of those assembled. . . . How wonderfully this ponderous mass of metal is under [control], far exceeded my most sanguine expectations. Finally, when the wheel had made the first complete turn, I could have yelled aloud for joy."

Rice telegraphed the gleeful news to Ferris, who wired back that crews should work day and night to hang the cars. Two days later, with Gronau and Rice aboard one, the wheel again lifted aloft. Gronau wrote: "So perfect is the machinery that we did not feel the wheel move."

Bands, flags, speakers and dignitaries marked the big wheel's official opening day, June 21. Even George W. G. Ferris himself materialized for the occasion. Little Egypt no longer sinuously ruled the Midway. Couples scrambled to be married at the

In Benares, India, a wooden wheel, or *Katcheli*, is moved by man power.

wheel's zenith, and had to settle for the superintendent's office. Newspapers invented stories of pets leaping from giddy heights, and published false rumors of it locking, fully loaded and helpless, against the sky (which may have prompted *Scientific American* to debate the possibility of equipping each car with a telephone).

The War Department formally requested logistical details. How, they wanted to know, could such an engineering construction feat be pulled off in a matter of months when Federal ordnance and fortifications took so infernally long? Engineers argued earnestly whether the monster wheel was such a true circle that, loosed from its moorings, stripped of cars and other impediments, and given one hypothetical but Herculean push, it might roll the thousand intervening yards into Lake Michigan.

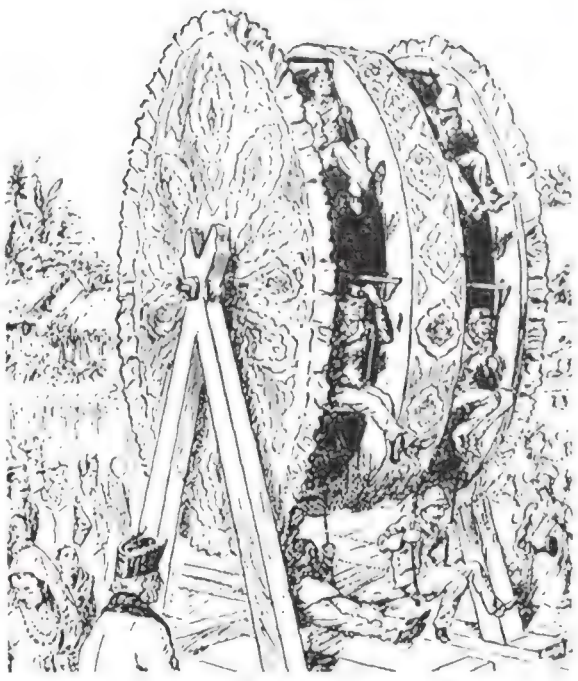
By fair's end in October, one-and-a-half million people had paid the exorbitant fee of 50 cents—equal to Exposition admission and ten times that of the merry-go-round—to take the two leisurely revolutions lasting 20 minutes. Many of them doubtless were reassured by the words of poet

Eugene Field, who would later do better by Wynken, Blynken and Nod:

The Ferris Wheel, with arms of steel,
High as a tower will wind you up;
If you should fall, for good and all,
The doctors they would bind you up.

If his wheel was Queen of the Midway, George Washington Gale Ferris was King. Writers followed him everywhere. One of them even interviewed him, and rode the wheel, during a furious northern gale that struck that July, renewing public fears about its safety. In the orotund style of the day he wrote: "Slowly the great wheel lifted them in the midst of the roaring, howling tempest. As the mad storm swept round the cars the blast was deafening. It screamed through the . . . girders, and shook the windows with savage fury. It was a place to try better men's nerves. The inventor had faith in his wheel. . . . But the reporter at that moment believed neither in God nor man."

Clearly, it was a heady interlude for the young engineer. Once on the ground with his eager Boswell, he left enduring evidence that his thoughts were not yet back to Earth. In a remarkably high-flown interview, Ferris confided that he had a plan to make Chicago a major seaport. How? Already he had taken out worldwide patents to revolutionize the Erie Canal by using compressed air in its locks instead of water. Compressed air and electricity, he informed the impressionable scribe, held the key to the "practical progress of the near future." Together they would convert water to power, haul the farmer's produce to market, deliver the city-man's mail, propel elevators, turn machinery, heat homes and cook.



Circular swing in Ceylon probably evolved from ancient water-lift design.

No one, his admirer concluded, could listen for an hour to such effortless, "brilliant" talk and not "feel in the presence of a man destined to play an important *role* in the industrial and mechanical advancement of this country."

With that excessively laudatory account Ferris' troubles began. Although he never claimed that the design was exclusively his own, after reading the story a cynical critic objected in print to the notion that Ferris had done anything new. Hadn't the Midway King's starry-eyed chronicler bothered to ask, along with Ecclesiastes, whether there was anything really new under the sun? Surely any engineer of schooling was familiar with the great sand wheels of Michi-

Ramshackle Albanian wheel ride is mainly held together with nails.

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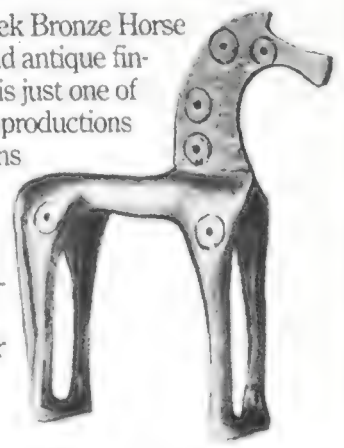

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Vienna wheel, in the Prater Park, figured in 1949 film, *The Third Man*, which starred Joseph Cotten.

gan, the Burden wheel, Sir William Fairbairn's English water wheels—all examples of pinion and tension principles? (Having put Ferris in his place, the author, a mechanical engineer, could not resist adding that London's upcoming exposition would have a wheel 50 feet higher than Chicago's, festooned with saloons and balconies, by jingo.)

Others now rushed to point out that Oriental and European history were replete with similar if smaller pleasure wheels (pp. 114, 115), among them the hand-operated swinging *Katcheli* of Russia and the "perpendicular roundabouts" of England. Why, hadn't two Indiana brothers named Conderman just lately invented a 35-foot wheel of metal tubing "with twelve buggylike cars"?

And right on Ferris' own doorstep, so to speak, one William Somers,

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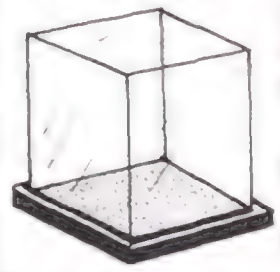

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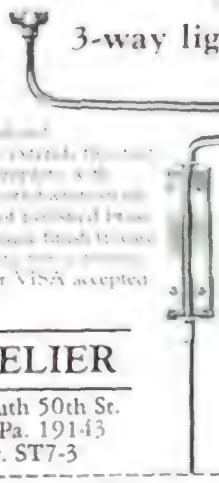

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who had devised a "double-rimmed Observation Roundabout," had been turned away by the Columbian Exposition when he sought a competing spot on the Midway. What did George Ferris say to that?

Ferris might easily have weathered this storm of innuendo, as he had the gales of July, for it was not the idea but the sheer size of his wheel that made it remarkable. But as critics carped, a series of financial reversals sent his fortunes crashing. He and the Exposition traded lawsuits in a bitter, inconclusive battle over the wheel's $400,000 profit. In the strained atmosphere that ensued, the great wheel stood idle, neglected and exposed through a harsh Chicago winter, until spring, when hundreds of workmen at a cost of $15,000 could frame it with timber, break it into numbered parts, and ship them by wagon train to flatcar storage at a nearby railroad siding.

There, gathering dust, the wheel waited out another winter of shifting possibilities and fruitless speculation. Coney Island wanted it, sort of. Atlantic City did, too. So did London, but the disenchanted Ferris refused. The mirage of an amusement park cum beer garden in mid-Manhattan beckoned, shimmered, then vanished. Meanwhile an Illinois bridge builder named William Sullivan went home from the Exposition to Jacksonville, Illinois, and designed what Ferris had not: a portable wheel. To date, the Sullivan family firm, Eli Bridge Company, has built, sold and erected some 1,300 Ferris wheels in far-flung sites ranging from Ecuador to New Zealand, from England to South Africa. Aside from the honor of having it named for him, Ferris would never realize a penny from the resulting multimillion-dollar spin-off.

In early 1895 Ferris took out a building permit on North Clark Street. The wheel would spin again as part of an amusement park. But neighbors, charging "undesirable industrialism," dealt the plan a mortal blow by denying the park a liquor license. Ferris managed to sell another $300,000 in bonds and regrouped. Now, however, depression stalked the land. The company went into receivership and for several more years limped anemically along. Then, more than $400,000 in debt, it went under the sheriff's auction hammer.

A bid of $1,800, by a junk firm,

After it was laid low with dynamite in St. Louis on May 11, 1906, woman in horse-drawn carriage paused beside wreck of Ferris' creation.

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won. "It's a shame, a terrible shame," protested Luther Rice after pointing out that, thousands of pounds of salvaged steel aside, the engines and boilers alone were worth ten times more.

"Yes," the bidder's attorney agreed, "but just think! It's going to cost $30,000 to take the wheel down."

Mercifully, George Washington Gale Ferris was not around to see that. Heartsick and depressed, he had been admitted to a Pittsburgh hospital in November 1896, where he died four days before Thanksgiving, at age 37. The cause of his unexpected death was variously reported as typhoid fever, Bright's disease, tuberculosis and the complications of worry brought on by overwork as he sought to stave off bankruptcy.

The great wheel, inexplicably spared a junkyard funeral, was to enjoy one last, brief fling at a fading glory. In 1904 workmen dismantled the standing pieces and sent them to St. Louis, to be reassembled on the grounds of the Louisiana Purchase Exposition. Although the wheel still ran flawlessly, its comeback was not a financial success. Despite a substantial box office, the profit was slim owing to the high cost of transporting and reerecting the wheel. When the owners abandoned it after the fair, outraged St. Louisians clamored for its destruction as an eyesore.

On May 11, 1906, the awful deed was done. According to an account in the *Chicago Tribune*, the old "white elephant died hard." A 100-pound charge of dynamite under the foundation knocked her to her knees: 250 feet in diameter, the wheel dropped to the ground.

As it settled, the *Tribune* reported that "it slowly turned . . . and then after tottering a moment like a huge giant in distress, it collapsed, slowly. It did not fall to one side, as the wreckers planned—it merely crumpled up slowly. Within a few minutes it was a tangled mass of steel and iron forty feet high."

Holes were bored in the foundation and another 100-pound blast provided the coup de grâce. The aging Queen of the Midway—"a wonder of two continents by reason of its cost, its dimensions, and its utter uselessness"—was no more.

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Book reviews

Red & Hot: The Fate of Jazz in the Soviet Union
S. Frederick Starr
Oxford University Press, $16.95

Four or five years ago I happened to see a play called *The Adult Daughter of a Young Man* in a theater on Gorky Street in Moscow. "Gorky Street" (the Moscow Broadway) actually means "The Bitter Street." The main character of the play is a former young rebel-without-a-cause of the Soviet Fifties. All his lifetime, he had cherished a song of his youth—the Glenn Miller hit "Chattanooga Choo Choo." To him the song embodied the code of rebellion. Consider how great his disappointment must have been when, in middle age, he heard a translation of the lyrics.

I remembered that play while reading *Red & Hot: The Fate of Jazz in the Soviet Union*. This book, as author Frederick Starr puts it, is "a long answer to a simple question frequently posed to me by friends: Is there any relationship between two of my principal interests, the Soviet Union and jazz?" Starr is a well-known and respected Slavic expert as well as an accomplished musician. He was founding Secretary of the Kennan Institute for Advanced Russian Studies at the Smithsonian's Woodrow Wilson Center; in 1979 he moved to New Orleans, where he was scholar in residence at The Historic New Orleans Collection and co-leader of the Louisiana Repertory Jazz Ensemble. He is now president of Oberlin College.

A professor friend of mine tells of a time when he attended a Washington jazz club with Starr. The party was in full swing when, all of a sudden, Starr climbed onto the stage and began to play the clarinet like a pro. In January, his Louisiana Repertory Jazz Ensemble toured the USSR. Following a formal concert, he played the clarinet in jam session with such Moscow stars as Alex Kozlov, Alex Zubov and German Lukianov.

Starr once called me from Dixieland and interviewed me on the subject of Soviet jazz. I was impressed by his thoroughness. He was interested in learning about the Oleg Lundstrem Orchestra, which had returned to Mother Russia from Shanghai without knowing of the antijazz campaign launched by Stalin's watchdogs; how they were exiled to Kazan where I was a medical student; about my reporting

for *Youth* magazine on the first and only international jazz festival (which was held in Tallinn, 1967).

By and large, the book reflects an impressive amount of research and work. There is a great deal of unique information, even for those intimately involved with the jazz scene in the Soviet Union. For example, it appears that the 1916 assassination of Rasputin was accompanied by the sound of a gramophone playing the American tune "Yankee Doodle." St. Petersburg's playboy, Prince Yusupov, who masterminded the slaying, was a devotee of the new imported rhythms of the cakewalk and ragtime.

By the end of World War II, the new jazz tunes (including the immortal "Chattanooga Choo Choo," of course) were brought to Eastern Europe by the Soviet Army bands. The Soviets, as America's anti-Hitler allies, permitted playing of the same music that had been condemned as filthy and degenerate throughout the Third Reich. But by the late Forties, the saxophone had been banned for production and sale in the Soviet Union because it was considered a symbol of Western decadence.

Starr had to interview many of his jazz colleagues and his fellow musicians in the Soviet Union, as well as those who have been able to emigrate to the West. Many of these people had heroically overcome a harsh life in the underground (often literally) during a period when the very word "jazz" sounded like a four-letter obscenity and playing the saxophone was equated with hooliganism. These same people led the jazz movement during the stormy period of the Sixties.

There are two phrases that have become part of the history of jazz in the Soviet Union. The first was pronounced by Maxim Gorky, a founder of Socialist Realism (Mr. Maxim Bitter himself). With his remarkable lack of esthetics, he described jazz as "the music of the gross," in other words, "the music of the fat cats." The second belongs to an American journalist who once said that jazz is the American secret weapon. With the help of these two notorious phrases, the Soviet ideology machine was primed and directed against the skinny young musicians who took pains to hide their sounds from the domestic fat "tigers."

The Soviet Union, as Frederick Starr puts it, has never been the "successfully organized and standardized monolith depicted by many of its more ardent friends and detractors. It has maintained uniform policies, to be sure, even totalitarian ones, but in the field of popular culture,"

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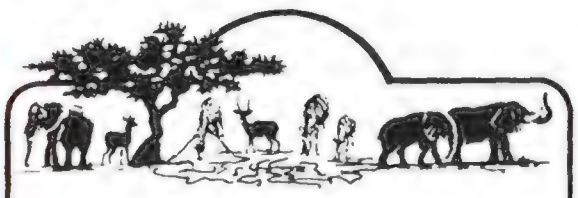

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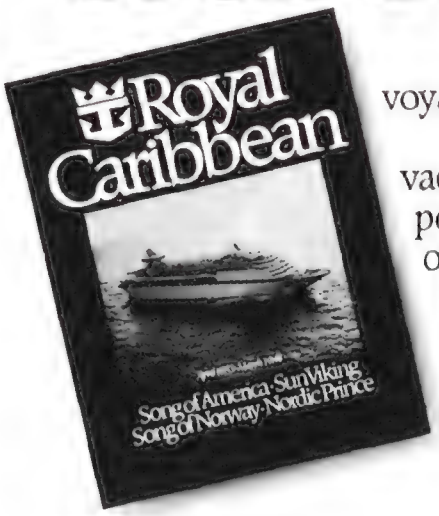

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where people look for more physical and individual freedom, "it has proven absolutely impossible to implement those policies effectively. Far from being docile and malleable, Soviet jazz fans have shown themselves to be independent and resourceful. Those who like jazz find ways of playing or hearing it, whatever policy may be. . . . It is no wonder that, in the long run, the government had to make its peace with jazz."

In light of what I have mentioned above, I questioned the use of the word "Red" in the title of the book. The jazz described by Fred Starr in his unique, breathtaking book is rather "hot," but not (really) "red." Neither is it "white," of course. The musicians in Russia, I believe, are always trying to avoid monochrome and escape toward the spectrum.

Vassily Aksyonov
Washington writer and former fellow of The Kennan Institute for Advanced Russian Studies of the Wilson Center

Morris Graves: Vision of the Inner Eye
Ray Kass
George Braziller, Inc., in association with The Phillips Collection, $35.

Morris Graves is a hard artist to admire. It is not the paintings that make the difficulties, but the man who created them. When I went to see the traveling retrospective (on view in Greenville, South Carolina, July 1-August 28) which is the occasion for this book, I tried to be properly academic, moving from picture to picture, notepad in hand—but again and again I was pulled up short, transfixed by a painting, suffused with a kind of warmth compounded of excitement and joy. This happened with paintings from all periods —the open-mouthed *Bird Singing in the Moonlight* (1938-39), the *Hibernation* (1954), in which the mandalas intersect, and *Moon Bird* (1979, p. 123).

Graves would reject the notetaker, of course, but I suspect that he would also disapprove of the awestruck, moonstruck admirer. In a 1952 letter, in which he expressed his regret at having sold so many paintings to unworthy buyers, he lamented that "the 'Audience' . . . stands so very frequently as a judgment against the spiritual content in the painting."

My reaction was one of esthetic delight and it comes from the sense of marvelous

A mystical work by Graves: *Moon Bird*

completion in a work. In his 1945 application for a Guggenheim grant, Graves differentiated between the "spiritually-realized form" he admired in the artists of Asia and the "esthetically-invented or imitated form" of Western art. As I look with pleasure at, say, *State of the World (Double-Necked Vessel)*, I am troubled by the sense that one side of Morris Graves, the spiritual leader as bully (the Zen master?), is coming between me and the image on paper, which is the vision of the other Morris Graves, whose art is his own quest for spiritual enlightenment.

Such a personal approach to the artist may be unfair since Graves is not so much pointing an accusing finger at me as gallerygoer as at himself. One of the best things about Ray Kass' long essay is that he provides the opportunity to see the struggle within the artist, the pull between the spiritual/artistic goals he sets himself, and the sense of recurring failure, which is often tied to his feeling about the artist in the marketplace.

Kass provides a chronological account of Graves and his work in which he discusses the paintings period by period and indicates the direct influence on them of the artist's preoccupation with both Eastern and Western mysticism, of his sense of connection between art and nature, of his response to place (his native Northwest and Ireland). Kass makes his own interpretative comments, but most of the commentary comes from Graves' own words—his revealing letters to his dealer, Marian Willard, his interviews with Kass and quotations from other sources, such as *The Drawings of Morris Graves* (New

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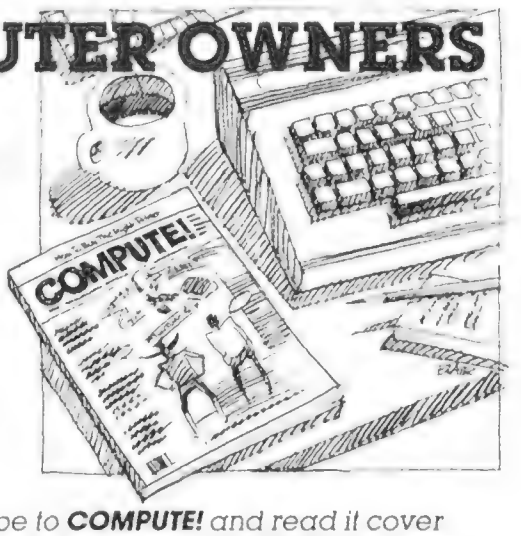

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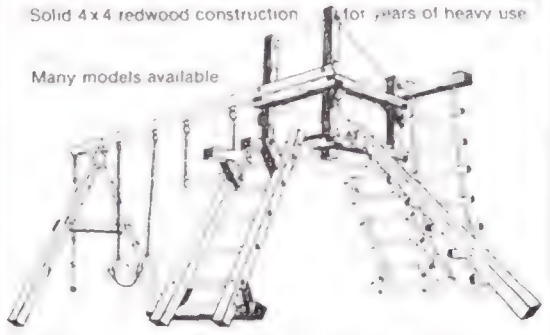
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York Graphic Society), the other indispensable Graves volume.

These sources also indicate the contradictions within the artist. Graves regularly protests that his work was not ready to show; yet, he has exhibited something every year since 1933, extensively since the Museum of Modern Art show that made him a national name in 1942. He often destroyed work that seemed wrong to him (paintings he made in Chartres), but he could also look back on what he kept, as he did in 1942, and dismiss most of that as "counterfeit." He can discount intellect, as in his praise of Klee, but be so specific about the symbols in his work that, even when they are derived from Eastern mystical iconography, he seems to be imposing an intellectual overlay on the spontaneity that he so admires. Yet, out of this often painful conflict come the paintings which, whether the content be anguished or peaceful, give me such a feeling of grace.

However valuable Kass' contribution, the heart of the book is the illustrations. There are the usual problems of reproduction. The color is not quite true, which is a dangerous fault only when Graves' dazzling white, as in *Shore Birds Submerged in Moonlight*, comes out as blue. Some of the small black-and-whites —*"Black Buddha" Mandala*, for instance —are so indistinct that the tinier images, important to both the meaning and the impact of the painting, become almost invisible. Despite these shortcomings, there is such a wealth of Graves here that it can serve as a valuable introduction to his work or, for the initiate, as a reminder of an earlier response to the paintings themselves. A remarkable painter, presented with understanding.

Gerald Weales
Professor of English
University of Pennsylvania

Code Name "Mary"
Muriel Gardiner
Yale University Press, $14.95

Suddenly, World War II is in again—a subject to read about, watch on television and think about, in an effort to understand the present. We are still a good way from being able to consider it dispassionately, or to sort out everything that needs to be sorted out in appraising the Nazi phenomenon and related totalitarianisms, but we're edging in the direction.

This is a book that will help. Not because it illuminates the ambiguities of what many people regard as the last morally easy war—it doesn't—but because it deals so directly with the problems of courage and ingenuity involved in resisting Hitler.

Code Name "Mary" is subtitled *Memoirs of an American Woman in the Austrian Underground*, and that's what it is. Muriel Gardiner's story is remarkably similar to that of "Julia" in Lillian Hellman's *Pentimento* (although she says she has never met Miss Hellman). While in Austria for psychoanalysis and medical studies, she was a fearless and effective worker for the illegal Socialist party and, as Hitler's juggernaut moved closer, for people trying to escape from the Nazis.

Gardiner grew up as a rich girl in Chicago—her father did well in business and her mother was a Swift. The road to socialism and the antifascist underground began when she noticed that the servants didn't have the luxurious life she and her family had.

Like many intelligent and sensitive young people, she was attracted to the idea of austere living and high purpose. By the time she finished Wellesley, reading, thought and contact with a few intellectuals had given her a full set of modern attitudes. She believed in socialism.

Author in 1934, the year she became "Mary" as worker for the underground.

women's rights, easygoing sex and psychoanalysis. She went to Europe in the 1920s, bent on studying to become a teacher. But it was psychoanalysis—both the desire to be analyzed and the hope of becoming an analyst herself—that kept her there.

She had a brief marriage to an Englishman, and a daughter. Thanks to family money, she was spared many of the problems of the less-affluent single parent. Still plenty of time for café life with Vienna's avant-garde of arts and politics, which led to the underground.

Gardiner was a cool, efficient broker in forged passports, hiding places and clandestine-meeting arrangements. The danger, of course, heated up as Hitler moved into Austria and "Mary" became additionally skilled at getting rid of documents, evading pursuers and the rest of the secret agent's work.

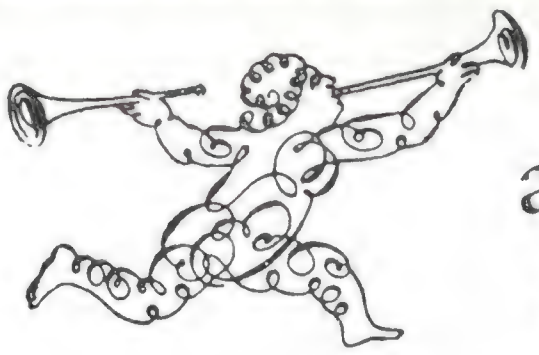
While all this was going on, she studied medicine at the University of Vienna, continued her analysis, raised her little girl Connie, and had an affair with the poet Stephen Spender. Later she met Joseph Buttinger, who was a leader of the Revolutionary Socialists and an underground operative. He would later become her husband.

For all the intrinsic interest of this material, the book is not as stirring as might be expected. Gardiner is too unflappable to give the outward events of her life their melodramatic due. And she obviously does not care to discuss her inner self.

It's the same with politics. There are many offhand references to socialism as a given, but no hint of factional strife within the movement or personal doubts about the ideas behind what she was doing. We learn only that she took it hard when Stalin and Hitler made their non aggression pact. She did, however, apparently give up on the Soviet Union at that point.

Muriel Gardiner's tendency to go bland at what ought to be particularly exciting points keeps this from being a great memoir. Still worth reading, though; considering what this woman did, it *has* to be—no matter how noncommittal she is about the intellectual and emotional dimensions of her experience.

Anne Crutcher
Editorial page editor
The Washington Times



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World War I Aviation October 16-21: World-renowned experts Jack Bruce, Peter Grosz, Walter Boyne, Donald Lopez and others from the National Air and Space Museum shed new light on the brave pilots and the evolution of their aircraft.

Aircraft Restoration: How To October 23-27: The master craftsmen of the National Air and Space Museum share their many techniques in workshops at the Paul E. Garber Facility (Silver Hill).

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Friedel Dzubas (through August 14) Retrospective includes 46 paintings.

National Museum of American History
Gifts of Glass, 1855-1920 (extended through September 5) Vases, plates, goblets and other objects from Tiffany, Hawkes, Dorflinger, Libbey, Steuben, New England Glass Works and Union Glass Company.

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The Art of Louis Paul Jonas (July 2-August 28) Seventy-five wildlife miniatures by American sculptor.

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For price information and tickets to Resident Associate events, call 357-3030:
Constable's England (July 18; 8 P.M.) Slide-illustrated lecture on John Constable's landscapes by British art historian Malcolm Cormack.
Return from Silence: China's Revolutionary Writers (July 13; 8 P.M.) Dr. Chung-wen Shi introduces film.
Through a Lens Brightly: Gravitational Images in Space (July 28, 8 P.M.) Lecture by Dr. Irwin Shapiro, Director of the Harvard-Smithsonian Center for Astrophysics.
The Urban Cat: Ecology and Public Health Impact (July 27; 8 P.M.) Lecture by Dr. James E. Childs, expert on urban cats, bats and rats.

Smithsonian on the air

Radio Smithsonian: July features include new information about the Earth's structure, a look at mother-infant relationships among animals at the National Zoo, and highlights from the 1983 Festival of American Folklife.
Here at the Smithsonian . . .. TV features this month include a look at a rare giant squid and a demonstration of the mighty Wurlitzer as it was played during the "golden age" of picture palaces.

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Grand Junction, Colorado (July 6-August 10) *A Collector's Eye: The Olga Hirshhorn Collection*, Western Colorado Center for the Arts.
Chicago (July 2-July 31) *Building a New World: Black Labor Photographs*, Chicago Historical Society.
New York City (July 23-October 2) *A Celebration of Birds: Louis Agassiz Fuertes and His Art*, American Museum of Natural History.
Toledo (July 9-August 7) *Upland Game Birds of North America*, Toledo Zoo.

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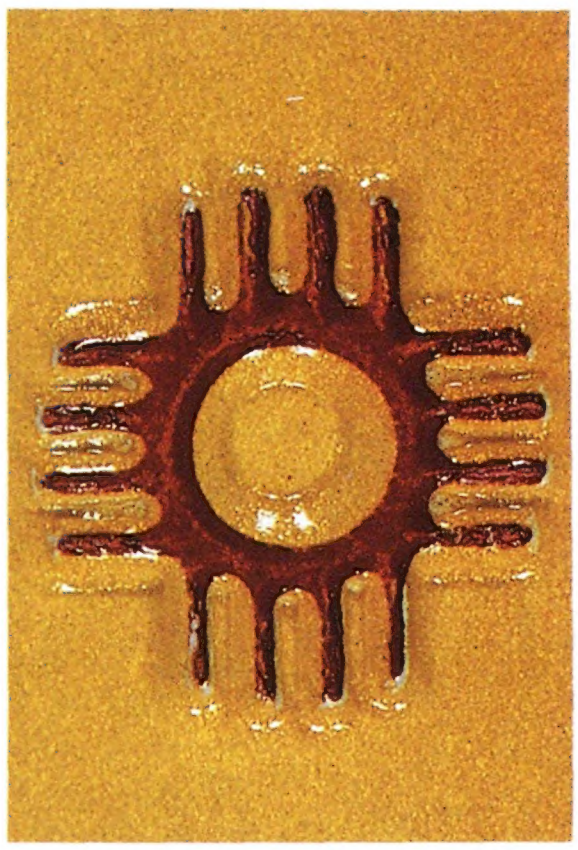
Before people, there were stars. In fact, we are made from stars: all but two of the elements that comprise the known Universe have come from the stars. Maybe that's why we have worshipped them, studied them to divine our destinies and, ultimately, coopted them for all manner of popular and commercial expression.

At night, we look heavenward to see them. But by day, as the Air and Space Museum's new "Stars" exhibit shows, they surround us as well. We've put them on our national flags, our license plates, our football helmets. We've used them as logos for august institutions.

"Stars" explores our known Universe from ancient times to the present. You enter through a Stonehenge arch. Along the way you pass through the sun (reproduced by sophisticated film-projection techniques) and encounter the 15-foot-round Apollo telescope mount, four astronomical satellites, and numerous hands-on displays explaining the sun, the Milky Way and extragalactic space. But you will also find how we have made the stars our own: you can press a button and hear Stevie Wonder sing "You Are the Sunshine of My Life" or one of two dozen other star songs as you peruse the display of hood ornaments, Doodle Boppers (star-tipped antennae worn by children), soup cans (chicken with stars) and all the other testaments to human stargazing.

Constance Bond

Record jacket advertises star quality of its earthbound musical performers.



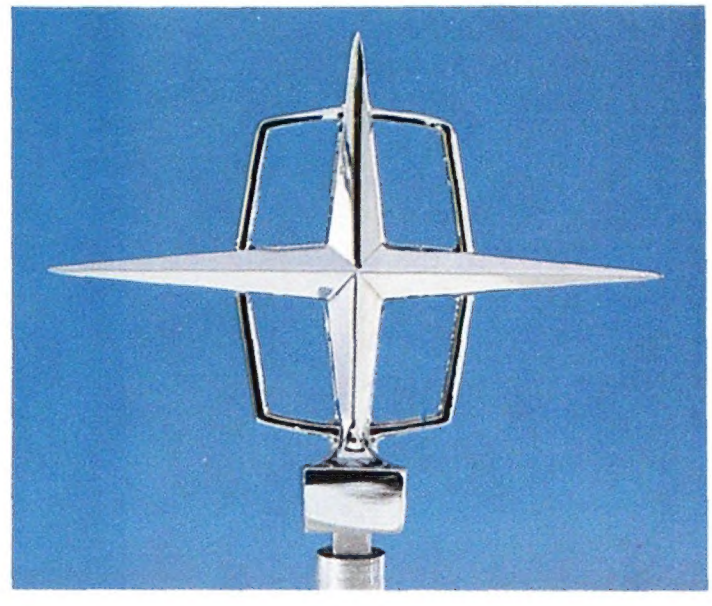
Not exactly sun-starved, New Mexicans nonetheless put it on license plates.

Star-and-trident emblem adorns cap of Seattle Mariners baseball player.

When the Dallas Cowboys come out on the field, their opponents see stars.

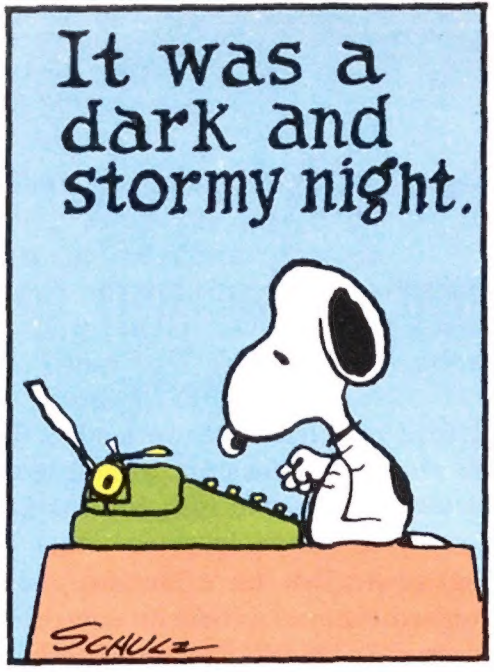
Red star on Yugoslav flag was symbol of partisans of Tito in World War II.

Four-pointed variation lent luster to the hood of a Lincoln Continental.



By William Weber Johnson

A Tale of Two Bagels *and other bits of execrable prose*



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San Jose State University, originally known as Minns' Evening Normal School, claims to be the oldest public institution of higher learning in California. It has survived fire and earthquake. It was the alma mater of Edwin ("The Man with the Hoe") Markham. But until recently it had no claim to international fame. All of that has changed. In England and Indonesia, Mexico and Australia, West Germany and South Africa, the Netherlands and New Zealand, as well as the United States, people have been talking about and writing to San Jose State.

The reason: a crazy literary competition, known as the Bulwer-Lytton Fiction Contest, created by Scott Rice, a droll, bearded professor of English.

Edward George Bulwer-Lytton was a statesman and noted dandy, an accomplished rider, boxer, fencer, whist player and dabbler in spiritualism. He was also a prolific producer of plays and novels. His most famous novel, a dramatic potboiler, *The Last Days of Pompeii* (1834), is still read. A lesser one, *Paul Clifford* (1830), is mainly remembered for an opening sentence that begins: "It was a dark and stormy night. . . ."

Like so many of Bulwer-Lytton's phrases (*e.g.*, "the pen is mightier than the sword"), "dark and stormy night" has become a cliché particularly favored by amateur writers like Snoopy, the beagle, who shamelessly borrowed it as the first line of his unfinished novel.

To encourage students to recognize, and parody, the bad in writing—as an aid to appreciation of the good—San Jose's Professor Rice has in the past asked them to seek out and imitate the worst opening lines of novels, and in making the assignment he often used "dark and stormy night" as an example. At San Jose State, creating and collecting bad first lines became a kind of campus game and, finally, an international competition. The response was voluminous—about 10,000 entries. Acknowledgment cards, carrying the likeness of Bulwer-Lytton, read, "We have received your execrable prose. . . ."

Some was pretty execrable. Purple prose proliferated: "The man stood in an abyss of cerebration ruminating pensively on the ebon thunderhead's impending extermination of the dark-blue suede empyrean with all its glittering, silver jewels and decided it was going to rain."

Puns were frequent. Examples: "A shameless exploiter of young female delinquents, Beauregard Fagin of Atlanta, Georgia, was a man for whom the belles stole." And, "It was raining cats and dogs and he stepped into a poodle." Also, "Colonel Winterbottom was a cold, stern man." Describing a conversation between two delicatessen owners on the eve of the French Revolution, one opener invoked Dickens with "It was the best of wursts and the worst of wursts." (The title of this "novel" was *A Tale of Two Bagels.*)

Naturally, Dickens was not the only famous novelist to have his prose rifled. One entry read, "Call me, Ishmael, any time." Another contestant, preferring poetic satire, threw grammar to the winds in mocking T. S. Eliot's *The Waste Land*: "Egg rolls is the cooliest lunch."

A good many entries took aim at currently popular writing genres. Romances, Gothic or otherwise: "Even the raging wind of the wild November night could not compete with the turbulence of Everard's mind as he lay tossing in his great ancestral bed, tormented by the glittering image of Juniper, dancing. . . ." Not to mention the contest's eventual winner: "The camel died quite suddenly on the second day, and Selena fretted sulkily and, buffing her already impeccable nails—not for the first time since the journey began—pondered snidely if this would dissolve into a vignette of minor inconveniences like all the other holidays spent with Basil."

Predictably, a majority of the parodists took potshots at science fiction: "I watched in helpless horror as the monster clawed its way up the TV tower and wondered what could be in the mutated genes of these Alaska King Crabs which caused them to snatch only Canadian aircraft from the sky."

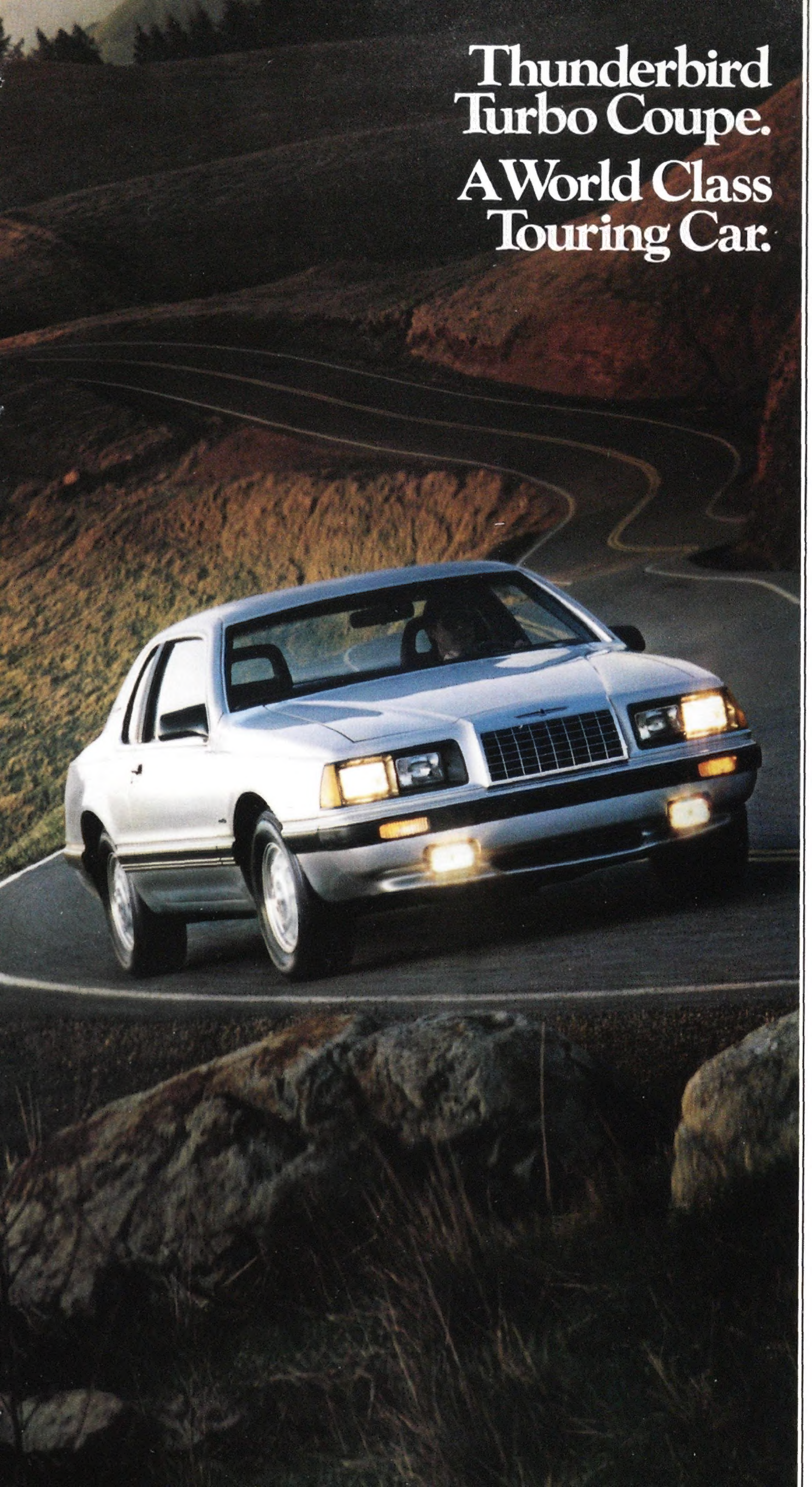
Professor Rice reports a wide use of Wow!, suggesting that many contestants were under 30. Similes took a terrible beating: "Screaming like a banshee . . . bleeding like a side of beef in an abattoir, the Chinese sailor croaked out one word: 'Firelight' . . . and fell to the ground like an epileptic lobster. . . ."

Fractured syntax flourished: "Safeway wasn't open when Keegan pulled his Chevy into the lot, its valves chattering, gun-blue cracked-ring smoke sputtering from its tail pipe, to get some eggs."

And then there was wholehearted dullness: "The story is closely related to my own life, which has been ordinary, loveless and dull, but which I will try to make exciting in the following pages."

Professor Rice has drawn few conclusions from the sheafs of inadvertently revealing prose. One is that people capable of writing well can write terrible sentences if they put their minds to it, while others just seem to have a natural talent for bad writing. Also: there are a lot of people who want to write, but lack an audience.

The briefest and perhaps most eloquent entry in the contest came from one of Rice's faculty colleagues. It consisted of just one word: "Alas!"



First impressions. As you enter Turbo Coupe you notice how the doors curve into the roof to smooth and quiet the airflow. You sit in an articulated seat. It's firm. Purposeful. Under and side thigh supports adjust to fit your body. The back angle and seat position adjust to align you with the controls. The pneumatic lumbar support adjusts to the curve of your back. Your feet feel how the pedals are positioned for heel-and-toe-operation. You test the five-speed shifter. The throws are short. Precise.

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